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# A Manual of Surgical Treatment

BY

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TO  
THE RIGHT HON.  
LORD LISTER. O.M., LL.D., F.R.S.  
THE FOUNDER OF MODERN SURGERY  
WITHOUT WHOSE WORK MUCH OF THIS BOOK  
COULD NOT HAVE BEEN WRITTEN.

28799



# PREFACE

## TO

### REVISED EDITION.

SINCE the first edition of this work was published many changes have naturally occurred in the field of Surgical Treatment. Attempts have been made from time to time to incorporate the most essential of these in successive impressions, but it is always difficult to interpolate new matter of this kind satisfactorily without extensive revision of the entire work. It has therefore seemed best to revise the matter throughout and to alter in it whatsoever was necessary to bring it up to date. The original scheme of the work has been adhered to; to depart from it would have been to abandon the fundamental idea upon which it was based. Every part of the book, however, has been thoroughly revised, and a considerable part has been re-written.

The pressure of other work rendered it impossible for the original authors to undertake a task of such magnitude with any hope of being able to complete it within a reasonable time. In Messrs. T. P. Legg and Arthur Edmunds they have been fortunate in securing collaborators who have rendered their task possible, and to them they are under a great obligation. To their colleagues Dr. Silk, Dr. D'Este Emery, Dr. Arthur Whitfield and Mr. A. D. Reid, they are also much indebted for help in the several departments of treatment with which these gentlemen are specially concerned. Mr. Arthur Edmunds, in addition to his share in the revision, has provided a number of the new illustrations; Messrs. F. Butterworth and S. A. Sewell have drawn the remainder.

Messrs. Down Bros., Allen & Hanburys, Barth, and others have kindly allowed the reproduction of many instrument blocks from their catalogues. Other figures have been reproduced by permission of their authors or publishers, and the source from which they are derived will be found duly acknowledged in the text.

LONDON, 1913.







to time been proposed: to do so would merely confuse the reader. Only those plans are described which our experience has led us to believe are the best, but with regard to these we have endeavoured to state exactly and in detail what we ourselves should do under given circumstances. In some cases no doubt several methods of treatment are of equal value, and while we have discussed at length that which we have ourselves been led to adopt, we have referred shortly to the others. L

We have not mentioned all the exceptional conditions that may be met with, but we have endeavoured to include all the circumstances with which the surgeon is most commonly called upon to deal. The task has been one of some difficulty, the more so as we have had, to a certain extent, to break new ground. This must serve as our excuse for the many shortcomings in the work.

LONDON, *April*, 1899.

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## DIVISION I.

# THE SURGICAL AFFECTIONS OF THE JAWS AND TONGUE.

### SECTION I.—AFFECTIONS OF THE JAWS.

## CHAPTER I.

### FRACTURES OF THE JAWS.

#### FRACTURE OF THE UPPER JAW.

FRACTURES of the maxilla are nearly always due to violence applied directly to it, although in some cases the fracture may extend from the skull.

**VARIETIES.**—*Fracture of the alveolar margin* is not uncommon ; it may be produced by severe blows, such as a kick from a horse, and may lead to detachment of the entire alveolus together with the hard palate. In other cases the fracture is limited to a small portion of the alveolar border, as sometimes happens after the extraction of teeth. *The nasal process* may also be fractured by direct violence, and is often accompanied by injury to the lachrymal sac or nasal duct ; emphysema is common in connection with it. *Fracture of the anterior wall of the antrum* may be due to blows, or to stabs or bullet wounds ; in the latter case the fracture is compound. *Fractures of the palatal process alone* are very rare, and are generally the result of gunshot wounds or direct blows, such as bayonet wounds. *Extensive fracture of the whole bone* or of both bones together is usually only part of some very serious injury, being generally associated with fracture of the base of the skull.

When the fracture is compound and opens either into the mouth or upon the cheek, there may be free hæmorrhage from rupture of the infra-orbital artery; associated with this there is often anæsthesia of the lip and the adjacent side of the nose due to injury to the infra-orbital nerve.

**COMPLICATIONS.**—The complications of this fracture are: epiphora and emphysema from damage to the lachrymal sac and nasal duct; anæsthesia of the soft parts from injury to the infra-orbital nerve; and hæmorrhage from the infra-orbital or some other artery. The case may also be complicated by fracture of the base of the skull and injury to the brain, while in gunshot wounds there may be a foreign body lodged in the bone or lying loose in the antrum, and this will require removal.

**TREATMENT.**—It is most important to reduce any deformity present, both from the point of view of the patient's appearance and also because mastication may be seriously interfered with unless the fragments are accurately replaced. Reduction of the deformity may be effected by manipulation under a general anæsthetic.

The most important deformity requiring remedy is *displacement of the alveolar border*, particularly when the whole of the latter is detached and its position relative to the teeth in the lower jaw is altered. After the alveolar border has been brought into position, it must be kept in place either by binding the two jaws together by bandages passing under the chin and over the top of the head, or by introducing a moulded splint between the teeth of the upper and lower jaws on both sides.

*When the fracture of the alveolus is only partial*, the replaced portion of bone may be held in position by securing the teeth in the fractured portion to the adjacent sound ones by means of a wire splint, such as Hammond's (see p. 5). Union takes place rapidly in these cases, and the apparatus may be discarded in about three weeks. When the fracture traverses other portions of the bone, it is unnecessary to apply any splint after reduction. *When the nasal process has been fractured*, reduction must be effected by instruments introduced into the nose, and as this fracture is usually complicated by fracture of the nasal bones, the after-treatment is similar to that described in Vol. III. p. 456.

*When the anterior surface of the bone has been crushed* or the orbital margin has been displaced, it may be necessary to make a small incision, introduce a raspatory beneath the fragments, and lever them into position. When this has been done, the bones usually retain their place; if not, they may be fixed by one of the fixation methods suitable for fractures (see Vol. II. p. 305). It must be remembered, however, that the fragments are usually so extensively comminuted that the chance of replacing them accurately is comparatively small, and that necrosis may occur if they are much comminuted. Any operation undertaken with













need not be removed until the sixth or seventh week ; it lies comfortably around the necks of the teeth and causes no inconvenience if the hygiene of the mouth is duly attended to. It is removed by cutting the main wire opposite each tooth. In all cases, free and frequent irrigation of the mouth with sanitas or boric lotion will be necessary.

(b) *Fractures situated behind the last Molar.*—In these cases the lower jaw must be kept closely applied to the upper while the fracture consolidates. This is done by a *jaw bandage* which is made from a strip of calico three inches wide and a yard long (see Fig. 4). A small slit is cut in the centre of this for the reception of the chin, and a four-tailed

bandage is then made by splitting up each end to within a couple of inches of the central slit. When applying the bandage, the point of the chin should lie in the central orifice. The upper limb of the bandage is carried horizontally backwards, and the ends are knotted together beneath the external occipital protuberance, while its lower limbs are carried vertically upwards and knotted over the vertex in front of the bregma ; the ends of the vertical and horizontal limbs are then tied together so as to prevent the anterior strips from slipping forward.

FIG. 4.—JAW BANDAGE. The lower limb of the bandage should be tied immediately below the external occipital protuberance.

Before applying the bandage, attempts should be made by manipulation to entangle the broken surfaces so that

the bandage simply has to keep the parts at rest after they are placed in position. In some cases a *moulded gutta-percha splint* is applied to the chin inside the bandage, but as a rule this is a source of annoyance and is of little advantage, except when the patient is restless or delirious. The saliva often dribbles away in these cases and soils the bandage rapidly, so that it requires changing frequently. When there are no teeth in the posterior part of the jaw, a modification of Gunning's splint may sometimes be modelled upon the alveolar margins so as to keep the jaws in position when fixed by the bandage, spaces being left for feeding.

The patient should be kept on a liquid diet, administered by means



necessary, so as to expose the seat of fracture. If the coronoid process is comminuted, or if the detached portion is small and a portion of the temporal muscle still remains attached to the jaw, the simplest plan is to remove the fragment. On the other hand, if there is a single large fragment and the wound is clean, it will be best to wire the fragment back into place. In enlarging the wound, the direction of the branches of the facial nerve should be borne in mind and also the position of Stenson's duct, which crosses the masseter parallel to and about a finger's breadth below the zygoma. The infra-orbital branch of the facial nerve lies just above and almost parallel to the duct, the temporal branch runs up almost vertically in front of the ear, while the malar branch occupies a position intermediate between the two. The incision should be transverse or slightly oblique downwards and backwards. After the operation a jaw bandage should be applied, and, when the fragment has been wired in place, the patient may move his jaw in the course of three or four days; when the fragment has been removed altogether, active and passive motion should be begun at once. Early movement of the jaw is of great importance because adhesions are very difficult to overcome if they are allowed to form, and may lead to some degree of closure of the jaws.

**Of Complications.**—*When there is an abscess in connection with the fracture*, it should be opened early and drained freely; it is essential to open the abscess from the outside, otherwise pus collects at the most dependent part of the cavity, keeps up the inflammation, and may lead to necrosis.

*Septicæmia* is very rare; its treatment is discussed in Vol. I. p. 189.

*Persistent dental neuralgia* is of rare occurrence. It usually subsides as soon as the fracture is properly reduced, but it may recur in a very severe form as the result of pressure upon the nerve by the callus thrown out during the consolidation of the fracture. If this be the case, the nerve must either be divided at the dental foramen or an operation for removal of the callus must be undertaken; in the latter, it is by no means easy to find and free the nerve, whereas division of the inferior dental nerve (see Vol. III. p. 478) at an early period will stop the trouble.

*Hæmorrhage* will very rarely require special treatment. If it is profuse and persists in spite of the free use of peroxide of hydrogen (10 vols.) or adrenalin chloride (1 in 1000), the surgeon will have to choose between exposing the seat of fracture and plugging the inferior dental canal, or tying the external carotid artery. Probably the latter procedure will be safer on account of the risk of sepsis after an operation upon the fracture.

For *non-union*, the ordinary treatment of ununited fracture must be employed, the edges being refreshed and the bones fixed together (see Vol. II. p. 305). The incision should be made over the lower border of the jaw and the soft parts pulled upwards; division of the mucous membrane should be avoided if possible. The fractured surfaces may

then be refreshed by a chisel, the lower margin of the bone drilled and a silver wire passed through it. Great care must be taken to see that the drill-holes on the opposite sides of the fracture correspond, and it is well to employ a grooved drill, which facilitates the passage of the wire. The alveolar margin may be steadied by a Hammond's splint (see p. 5).



## CHAPTER II.

### AFFECTIONS OF THE TEMPORO-MANDIBULAR ARTICULATION.

#### DISLOCATION.

FROM the point of view of treatment these affections may be divided up into recent dislocations, unreduced dislocations, and subluxation of the inter-articular fibro-cartilages.

#### RECENT DISLOCATIONS.

Dislocation of the lower jaw may be unilateral or, more commonly, bilateral. It is more frequent in women than in men, and usually results from yawning, laughing, or some other action in which the mouth is widely opened. It may also occur from indirect violence, such as a blow on the chin, especially if this be applied in the downward direction so as to force the mouth open. In the normal movement of opening the mouth the condyles of the lower jaw, accompanied by their inter-articular fibro-cartilages, glide forwards over the eminentiæ articulares, on the summits of which the condyles lie when the jaw is fully open. If the depression of the lower jaw is carried beyond this, the inter-articular fibro-cartilages remain stationary owing to their connection with the bone, while the condyles slip forward in front of the eminentiæ articulares, and becomes fixed there by the contraction of the temporal and masseter muscles. The result is that the mouth cannot be closed, any attempt to shut it being met by contraction of these muscles; the saliva dribbles away and there is severe pain. Mastication is impossible, and speech is almost unintelligible.

**TREATMENT.**—In order to reduce a *bilateral dislocation*, each condyle must be pulled downwards from the temporal fossa until it reaches the level of the eminentia articularis; it is then pushed back into position. Reduction is usually effected without an anæsthetic. The patient sits upright in a chair, with the head supported by an assistant or against







## INFLAMMATORY AFFECTIONS.

The temporo-mandibular articulation may be the seat of various inflammatory conditions, which cause considerable trouble from interference with mastication and articulation. Among them may be mentioned: acute rheumatism; gonococcal arthritis, which is fairly frequently met with; suppurative arthritis, resulting from a wound of the joint, from some septic focus in the immediate neighbourhood, or as a part of a general pyæmic condition; osteo-arthritis; and sometimes, though very rarely, tuberculous disease.

**TREATMENT.**—The treatment of these conditions differs in no essential respect from the treatment of similar affections in other joints.

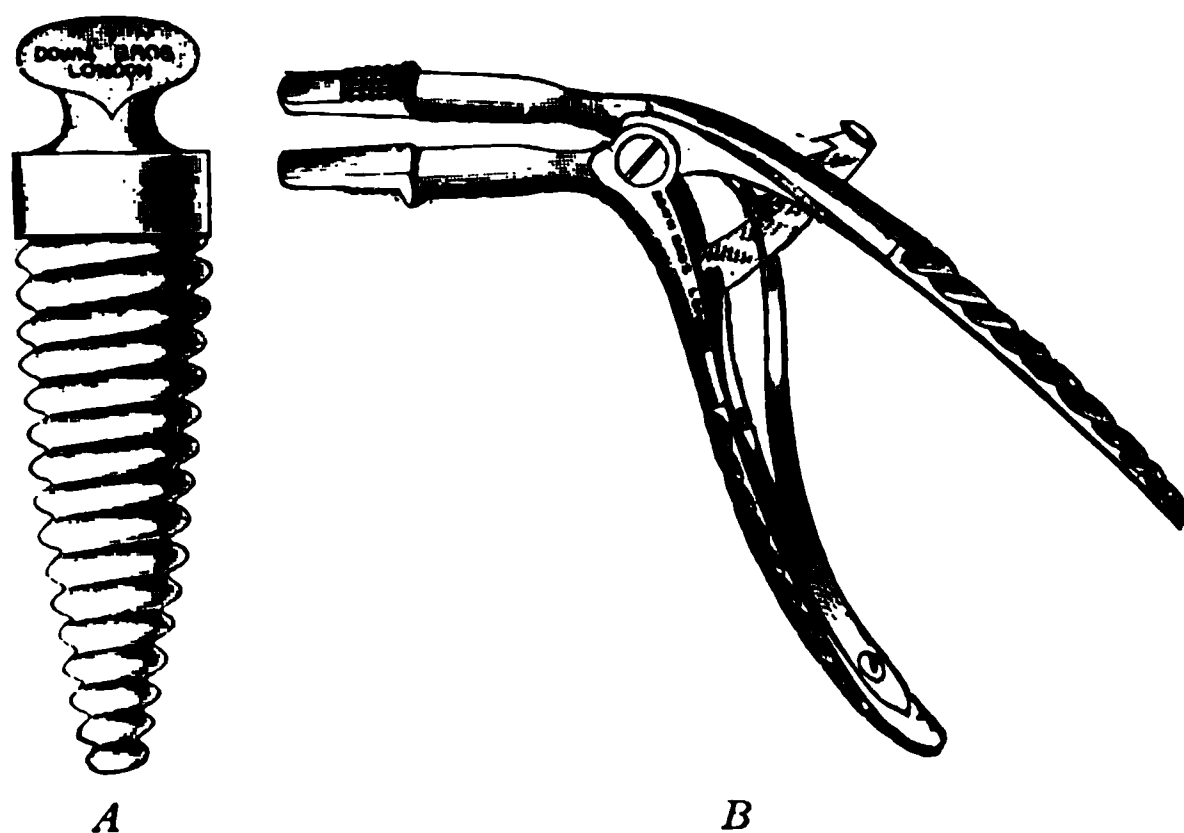


FIG. 6.—GAGS FOR ANCHYLOSIS OF THE JAWS. *A* is the conical screw-gag of boxwood. *B*, the powerful metal form.

It is, however, important to remember that the stiffness which is apt to result from any inflammatory affection of the articulation may cause considerable trouble to the patient subsequently, from impaired mobility and inability to separate the teeth. This is especially apt to occur after rheumatic or gonococcal arthritis. Movements of the jaw should therefore be commenced as soon as the inflammation has passed off, and, if necessary, adhesions should be broken down under an anæsthetic, the administration of which, in cases of closed jaw, however, requires great care. When there is much tendency to contraction, the best plan is to employ some form of gag to keep the teeth apart. A conical boxwood gag or a double wedge provided with a screw arrangement so as gradually to increase the separation between the teeth (see Fig. 6) may be used.



## CHAPTER III.

### INFLAMMATORY AFFECTIONS OF THE JAWS.

INFLAMMATION of the gums and jaws is most commonly associated with caries of the teeth. It may also occur from the accumulation of tartar around the neck of the teeth, from the action of drugs, such as mercury or phosphorus, from septic infections and aphthous conditions of the mouth, or in connection with specific infective diseases, such as syphilis, tubercle or actinomycosis; it may also be associated with digestive troubles. The inflammation may be limited to the alveolar process or may affect the body of the jaw; it may commence in the periosteum and lead to thickening of the bone, or it may begin in the substance of the bone and end in alveolar abscess or necrosis.

#### GINGIVITIS.

In inflammation of the gums *from excessive administration of mercury* the treatment is to stop the administration of the drug, to employ anti-septic mouth-washes, and to administer chlorate of potash in ten-grain doses three or four times a day. Chlorate of potash (gr. x ad ʒj) is also an excellent mouth-wash.

*An aphthous condition of the mouth* is not uncommonly accompanied by a similar affection of the gums; the treatment consists in free purgation, and the employment of antiseptics, such as boro-glyceride, sanitas, or weak Condyl's fluid. Glycerinum acidi carbolicum diluted to 1 in 40 is an excellent soothing application.

In *secondary syphilis* there is also ulceration of the gums following the formation of mucous patches upon them. The treatment is that of secondary syphilis (see Vol. I. Chap. XI.).

#### PYORRHŒA ALVEOLARIS.

The most interesting of the inflammations of the gums is that known as pyorrhœa alveolaris; it often escapes recognition or is mistaken for





leads to what is popularly known as a 'gumboil.' When the fang is long, however, and the abscess more deeply seated in the body of the jaw, the pus generally reaches the surface of the bone lower down, and may lead to adhesion of the cheek to the jaw and to the formation of an abscess on the face—generally near the lower border of the jaw.

An abscess which follows the latter course is sometimes mistaken for a suppurating gland, but when it is opened, a probe will pass upwards into the channel in the bone from which the pus is escaping. In the case of an alveolar abscess in the upper jaw, the pus may make its way into the antrum and cause suppuration there. In the milder forms of alveolar abscess there is no necrosis, but when the inflammation is severe, this may occur and may sometimes be extensive; the severe forms are most frequently met with when the suppuration occurs in connection with an impacted wisdom tooth.

**TREATMENT.**—Removal of the tooth is essential in most cases, and if the pus has not reached the surface of the bone, this often suffices for the cure of the disease, the pus finding its way through the tooth socket and the abscess cavity gradually closing.

When the pus has made its way externally either through the gum or beneath the skin, it must be evacuated, but healing will seldom occur until the tooth is removed; unless this is done, a sinus, leading through a channel in the bone to the root of the tooth, may persist for a long time. On the other hand, the sinus generally closes very quickly when the tooth is removed. It is very important to prevent the abscess from spreading to the cheek, and therefore, when the cheek is becoming adherent to the jaw, it is well to incise the indurated tissues freely from within the mouth by a vertical incision through the mucous membrane as it is reflected from the gum to the cheek. Pus will usually be found, and if that is the case the opening in the bone leading to the tooth can be identified and enlarged, the tooth removed, and the wound well drained; in most cases the inflammation will subside without extending further into the cheek.

### ACUTE NECROSIS.

The extensive and violent inflammations leading to necrosis of portions or the whole of the jaw may be due to a carious tooth, to suppuration around an impacted wisdom tooth, or to fracture of the jaw. These affections usually occur about the angle of the lower jaw; they are not common in the upper jaw. Pus readily forms between the periosteum and the bone and the necrosis may be considerable.

**TREATMENT.**—The treatment must be carried out on the lines already indicated for acute osteitis generally (see Vol. II. p. 433). The first point is to remove any local cause as quickly as possible; therefore, any carious teeth or an impacted wisdom tooth should be extracted without delay. This is often difficult as the jaws are generally more or



dividing any bridge of bone which interferes with its easy extraction. It is only rarely that an external opening is required. Care must be taken that all the necrosed bone is removed and that no spicules are left behind. No dressing is necessary, except possibly a temporary plug of iodoform gauze if there is much oozing, but this should not be kept in for more than a few hours, otherwise it will become extremely foetid. The mouth should be washed out frequently with an antiseptic mouth-wash, such as peroxide of hydrogen (10 vols.), sanitas, or Condy's fluid, and the drainage tube introduced into the cavity from outside should be retained until the sinus closes, which it usually does rapidly. The diet should be liquid or semi-solid at first.

Steps must be taken to counteract the tendency to closure of the jaws that is so often associated with necrosis in the neighbourhood of the ascending ramus, and therefore, when the necrosed fragment has been removed, the mouth should be kept open by a wedge placed between the teeth on the sound side ; provided that the new bone is so firm that it will not break, repeated active and passive movements should also be carried out. The patient should sleep with the wedge in the mouth, so secured that it cannot slip.

### TUBERCULOUS DISEASE.

This affection is not common and chiefly occurs in the upper jaw, especially about the orbital margin and in the neighbourhood of the malar bone ; it may also be met with in the lower jaw in the neighbourhood of the angle. The treatment is similar to that of tuberculous disease of bone elsewhere (see Vol. II. p. 453). When the disease is superficial, the tuberculous focus should be removed quite early, and in all cases the incisions should be so planned as to injure the parts and scar the face as little as possible.

### PHOSPHORUS NECROSIS.

This condition is fully described in Vol. II. p. 450.

### ACTINOMYCOSIS.

This affection is dealt with in Vol. II. p. 458, but certain of its features are best marked in connection with the lower jaw, and require notice here.

The lower jaw is a common seat of actinomycosis which leads to the formation of a slow growing tumour of variable size, which may be mistaken for sarcoma. The source of infection is often a carious tooth or an ulcer of the gum. The swelling is generally near the angle of the jaw where it commences as an indurated mass, the skin over which has a characteristic bluish-red appearance. Small yellowish pustules soon

appear on the surface, burst, and discharge the characteristic yellow granular débris. There is often widespread induration in the masseteric region and in the neck.

**TREATMENT.**—Large doses of iodide of potassium (gr. xx.—xxx. three times a day) are most valuable. In addition, all the diseased tissue should be scraped away freely after sinuses have been slit up to facilitate access. It is a good thing to expose the affected area to the X-rays during the course of the drug treatment. The scraping may be accompanied by very free oozing that may require firm pressure for its arrest.

## CHAPTER IV.

### TUMOURS OF THE JAWS.

#### CYSTS.

It is not uncommon to find cysts in the jaws which originate in connection with the teeth. These cysts are of three kinds: Dentigerous cysts, simple dental cysts, and multilocular cysts.

#### DENTIGEROUS CYSTS.

These cysts are also known as Follicular odontomes. They contain a clear, somewhat mucoid fluid; they are unilocular and have either a well-developed tooth or the rudiments of a tooth in their interior. They may occur in either jaw and usually develop in connection with the permanent teeth; they have been found, however, in connection with the temporary teeth. They generally appear between seven and thirty years of age. They increase slowly, and gradually expand and thin the bone over them, so that in advanced cases there is the sensation known as 'eggshell crackling' on pressure; indeed, the bone may be actually destroyed and fluctuation may be present. In the upper jaw the cysts extend upwards and bulge into the antrum, and they also dilate the bone outwards so as to form a prominence on the cheek. They may become infected and undergo suppuration.

**TREATMENT.**—The treatment consists in free removal of the cyst wall which, in most cases, can be carried out from the mouth. The mucous membrane is reflected from the swelling, the outer wall of the cyst cut away with scissors or cutting-pliers, the lining membrane of the cavity scraped out and any tooth in the interior removed. In addition to scraping the cavity so as to get rid of the lining membrane of the cyst, it is well to gouge its surface thoroughly and afterwards to sponge it with undiluted carbolic acid; it should be stuffed lightly with strips of cyanide gauze









## MYELOID SARCOMA.

The general characters and appropriate treatment of this form of growth have been dealt with in connection both with tumours in general (see Vol. I.) and with neoplasms of bone (see Vol. II.). As, however, it affects the jaws fairly frequently, and as its treatment there presents some special features of importance, it requires further consideration here.

The growth is more common in the mandible than in the maxilla. It may occur as a small nodular outgrowth from the margin of the gum—a variety of the so-called ‘epulis’—or it may be a typical endosteal tumour, expanding the bone and giving rise to the characteristic ‘egg-shell crackling.’ Its malignancy varies, but the majority of cases are of the semi-benign type usually associated with the name ‘myeloma.’

**TREATMENT.**—*When the tumour assumes the form of an epulis*, its treatment will follow the lines appropriate for the treatment of that affection, but the operation must be radical. The tooth nearest the tumour on each side should first be extracted, and vertical incisions must be made through the muco-periosteum of the gum, well wide of the tumour on each side; these are joined by a horizontal cut at some distance below the growth, and the portion of the jaw thus marked out is removed in the manner described on p. 27. The portion of bone taken away should include the whole depth of the tooth socket at least.

*When the tumour is endosteal*, it will suffice, in the first instance at any rate, to scrape the tumour out of the bone with a sharp spoon and a gouge, and then apply undiluted carbolic acid freely to the wall of the cavity. The question then arises as to the best way of dealing with the expanded shell of bone. This varies somewhat, according as the growth is in the mandible or in the maxilla. *In the mandible* all the expanded shell of bone should be cut away with a chisel after reflecting and preserving the muco-periosteum on both sides. The inferior margin of the bone should be preserved in every case if possible, so as to avoid deformity. The reflected periosteum is then brought over the cut surface of the bone by catgut stitches. *In the maxilla*, it is not always necessary to remove the expanded bone as recommended above. Deformity can be avoided by pressing back the thin shell of bone after the tumour has been shelled out until it is flush with the normal level of the bone. This will probably cause partial fracture, but that is of little consequence as the drainage is free.

No dressing is required. Frequent syringing with hydrogen peroxide (10 vols.), sanitas or Condyl’s fluid, should be employed, and care taken to see that food does not lodge in any cavity left. Should it do so, it must be dislodged by a jet of water.

*When a myeloma has recurred after removal*, it must be looked upon as a malignant growth of the jaw, and appropriate treatment adopted (*vide infra*).







by means of a Junker's apparatus and tube, is the most convenient, and

FIG. 9.—APPARATUS FOR THE INTRAVENOUS ADMINISTRATION OF ETHER. A, receptacle containing the mixture of ether and saline solution. The stopper must not fit tightly; it is best to replace it by cotton-wool. B, stop-cock regulating flow from A to D. D, drop-bottle or the purpose of excluding air from the circulation. The stopper C must fit loosely or be replaced by cotton-wool. E, stop-cock regulating flow into vein through the cannula. F, an inspection tube in the tubing which can be immersed in hot water to keep the fluid at a proper temperature.



the most delicate regulation. Dr. Rood advocates the administration,

in this way the face is left free for the operation. The objections to the use of ether in these cases have been largely overcome of late by the introduction of two methods of administration, which, though still on trial, bid fair to become of considerable service. We owe the following paragraphs to the kindness of our colleague, Dr. Silk.

*'The administration of Ether by the Intravenous Method.*—This plan was first introduced by Burckhardt, and in this country by Rood (*British Medical Journal*, October 21, 1911). Ether is dissolved in isotonic salt solution in the proportion of one ounce of ether to each pint of fluid, and this is gradually introduced into a vein in the arm or leg, in precisely the same way as an ordinary saline injection, and, of course, the same care must be taken that the solution and apparatus are strictly aseptic. Certain special precautions are necessary. The fluid must be warm, but the temperature should not exceed 90° F., otherwise the ether will begin to boil; to prevent the formation of thrombi, the flow must be absolutely continuous, and this can be ensured by the apparatus devised by Rood (see Fig. 9). Until full anæsthesia is obtained, the flow of fluid must be free, but when once narcosis is established (in three to five minutes) the supply may be cut off to a mere dribble. The anæsthesia produced is generally very satisfactory, and capable of









are grasped in forceps. The next step is to detach the periosteum from the orbital margin and push it upwards, carrying with it the orbital fat and the eye, and to keep the latter out of harm's way by means of a suitable spatula.

The surgeon then divides the various connections of the upper jaw. The junction of the malar bone with the maxilla is first sawn through, keeping the saw in the line of the spheno-maxillary fissure, and then the nasal process of the maxilla is divided after the soft parts of the nose have been detached from the bony framework. The cut runs obliquely upwards and backwards from the lower edge of the nasal bone to the lachrymal (see Fig. 13); it is com-

pleted with cutting-pliers. It is well in some cases to divide the floor of the orbit a little inside the orbital margin of the maxilla, so as to leave a support for the eye. The mouth is next opened with a gag, a central incisor removed and a transverse incision made along the posterior edge of the hard palate, separating the soft palate from the hard, from the middle line to the hamular process. The muco-periosteum of the hard palate is then divided down to the bone in the middle line from behind forwards; the mucous membrane of the floor of the nose is also divided from the edge of the hard palate to the aperture of the nostril by means of a knife passed into the inferior meatus after the ala of the nose has

FIG. 13.—LINES OF BONE SECTION IN FERGUSON'S OPERATION.

been detached from the bone and pushed well over to the opposite side. The alveolus and the hard palate are next sawn across with a narrow saw introduced into the nose and kept strictly parallel to the palate, for fear of damaging the base of the skull; the division is often completed with a pair of powerful cutting-pliers. The pliers are then used to free the upper jaw finally; one blade is inserted into the nose and one into the orbit along the saw-cut through the nasal process, and (using the bridge of the nose as a fulcrum) the maxilla is forcibly levered out. As soon as the posterior attachments are felt to give way, the jaw is seized with a pair of lion forceps, taking hold of the alveolar and orbital margins, and rapidly twisted out (see Fig. 14).

In some cases the jaw and the tumour come out intact; when the disease is extensive, it may break and only a part comes away. In



especially in the later stages. Sponge pressure nearly always suffices to check the oozing after the jaw has been removed, if it is associated with douching the face with ice-cold water. There is remarkably little shock accompanying the operation, and in the majority of cases the wound heals without any complications. Patients who are very feeble or advanced in age may succumb, however, especially when septic cellulitis or erysipelas attacks the wound or putrid material passes down the air passages and gives rise to septic pneumonia. As a rule, however, the cavity left is so widely open that the discharges escape freely, while the application of the chloride of zinc solution after the operation apparently protects the tissues from sepsis for two or three days. The performance of a preliminary laryngotomy as a routine measure is the best safeguard against infection of the air passages during the operation.

*After-treatment.*—The packing introduced at the time of the operation should be removed within twenty-four hours at the latest, and should not be reinserted unless there is still serious oozing. The cavity should be cleansed frequently by spraying it from the mouth with a solution of peroxide of hydrogen (10 vols.), boro-glyceride or sanitas, and the patient should wash out the mouth repeatedly with these antiseptic solutions. When the wound is granulating freely, it is a good plan to pack the cavity lightly with gauze before a meal; this forms a roof to the cavity of the mouth, and thus enables the patient to swallow without any food passing up into the large cavity above. For the first two or three days it is well to rely on nutrient enemata and rectal injections of saline solution, so as to avoid accumulation of decomposable food in the mouth; the patient may, however, have plenty of water to drink. If he is feeble, he may be fed from the first by a nasal tube passed through the sound nostril. As soon as the wound begins to granulate, liquid food may be given by the mouth by means of a feeder passed well into the pharynx along the sound side. The mouth must always be well washed out after every feed. After about three weeks, solid or semi-solid food can be taken if the cavity is temporarily plugged with gauze. The patient may generally be allowed to get out of bed after three or four days. In two or three months the contraction of the cavity will be nearly complete, and the patient should then be sent to a dentist to have some apparatus made to fill the cavity and to carry the teeth; the ultimate result is often remarkably good and the deformity slight.

**2. Of cases in which the disease is primarily Nasal.**—When the growth originates in the nose or in the ethmoidal area of the jaw, and when surgical treatment seems justifiable, the operation described above can be modified—greatly to the patient's comfort—by retaining the palate and part at least of the orbital plate. The operation is often called by the name of Moure, who described it in 1902. It may be conveniently termed Lateral Rhinotomy, and is done as follows:—

**Lateral Rhinotomy.**—The posterior nares must be plugged, so as to

















for that on the tongue, or whatever part the disease is spreading from, to split the cheek outwards towards the masseter. The incisions required for these cases will be described either in connection with excision of the lower jaw (*vide infra*) or with cancer of the tongue and floor of the mouth (see Chap. IX.). The point which we wish to emphasise here is that a bridge of bone connecting the anterior and posterior parts of the jaw should be left intact whenever this is possible, and this can usually be done by making an incision below the jaw and turning up the soft tissues.

Tumours growing elsewhere than in the alveolus usually involve the removal of the whole thickness of the affected portion of the jaw, and the following operations may be required according to the extent and seat of the tumour:—

1. Excision of one-half of the jaw.
2. Excision of the horizontal ramus or portions of it on one side of the symphysis.
3. Excision of the symphysis.
4. Excision of the entire jaw.

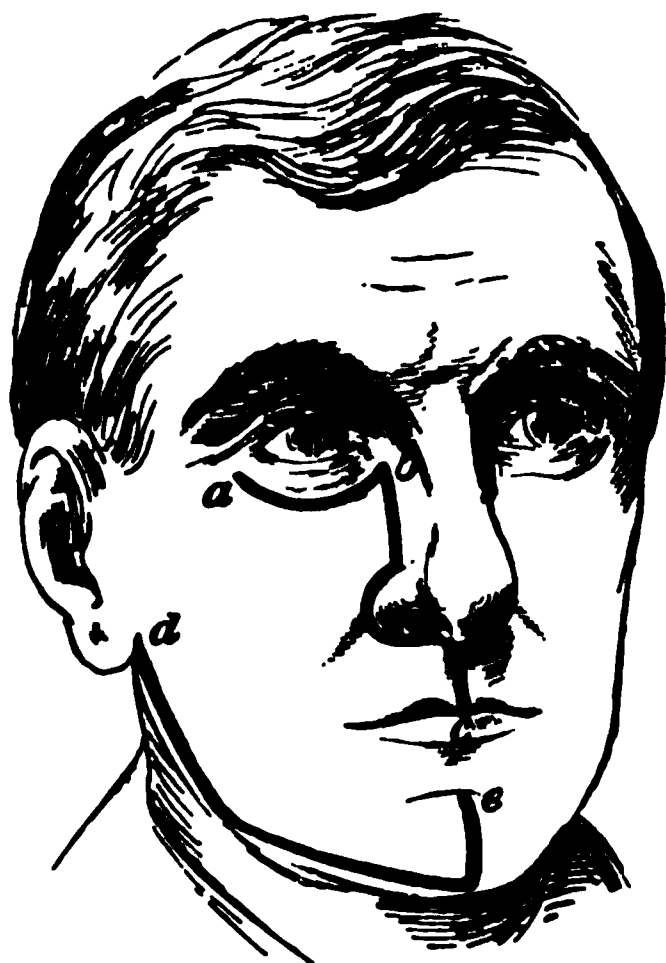


FIG. 22.—INCISION FOR REMOVAL OF THE MANDIBLE. The incision, *de*, is for excision of the mandible.

**Removal of one-half of the Lower Jaw.**—The patient is propped up by pillows beneath the shoulders, and the head allowed to hang back over a sand-bag and turned to the sound side. Chloroform should be administered; laryngotomy is unnecessary unless the growth extends beyond the limits of the jaw and involves an extensive operation, in which case it is carried out in the manner described on p. 33. The finger is thrust between the lower

lip and the gum in the middle line, and made to define the reflection of the buccal mucous membrane on to the jaw. The knife is then introduced through the skin, just below this point, and carried thence vertically down to the edge of the jaw, after which it runs about an inch below the lower border of the horizontal ramus as far back as the angle, where it turns up along the posterior border of the ascending ramus to the lobule of the ear (see Fig. 22). This incision is deepened and the facial vessels are clamped and divided. The flap—which should not take up any of the muscles attached to the jaw—is then raised until the line of reflection of the mucous membrane on to the jaw is reached, but at this stage the buccal cavity should not be opened.

The soft parts are next separated from the inner surface of the jaw, beginning at its lower border; the muscles attached to the jaw are



for the first few days. After the fifth day, the drainage tube can be taken out and shortened and put back in the external part of the track. The tube can usually be left out about the tenth day, by which time the whole incision will be healed with the exception of the drainage tube track.

For the first two or three days, the patient must be fed mainly by enemata unless he is very feeble, but he may have plenty of water by the mouth. At first he finds it difficult to swallow, and putrescible food may lie in the wound and increase the septic troubles. In two or three days, however, the tissues are sealed off, and liquid nourishment may then be given by the mouth, the fluid being put in a feeder to which a piece of india-rubber tubing is attached, and carried well back towards the pharynx on the sound side. It is well to turn the head to the sound side and rather depress it when taking food, so that the fluid runs down along the healthy mucous membrane and does not come in contact with the raw surface. If this is not tolerated, the nasal tube may be used. After taking food, the mouth must be thoroughly washed out. At the end of a week semi-solid food may be given, and usually the patient may be allowed to get up. The bowels should be kept freely open and the mouth frequently syringed with antiseptic lotions, especially after taking food.

The operation often requires modification according to the size and situation of the tumour. In some cases portions of the skin over the tumour must be taken away ; a plastic operation is then necessary. As a rule, it is unnecessary to cut through the free margin of the lip at the anterior end of the incision, but when the tumour is of great size, it may be impossible to avoid doing this ; care must then be taken in suturing the incision to see that the red line is in accurate apposition.

When the jaw is much destroyed by the growth, fracture may take place when attempting to disarticulate it ; under these circumstances, the fractured portion should be detached as rapidly as possible and the ascending ramus of the bone seized with lion forceps, pulled downwards, and twisted or dissected out as before.

**Removal of the Horizontal Ramus alone.**—When the tumour is endosteal and well limited, or when it is a small epithelioma, the ascending ramus may sometimes be left behind. The method is similar to that already described, except that, instead of detaching the coronoid process and disarticulating, the jaw is sawn across at the angle.

When the ascending ramus is left, it is well to try to keep the teeth on the sound side in proper position, in some more effectual manner than by the use of inter-dental splints. A method by which the gap can be kept open, and which is convenient in some cases, is by bridging it with a bar of nicked steel or an ivory peg fixed into the bone. Holes are drilled on each side to receive the metal peg, the length of which is such that the gap shall be of proper width when the ends are fixed into these



## CHAPTER V.

### TUMOURS OF THE NASO-PHARYNX.

TUMOURS in the naso-pharynx may be either polypoid or sessile, simple or malignant. The ordinary naso-pharyngeal polypi may be simple fibromata, but, perhaps, most frequently they are fibro-sarcomata, and are very apt to recur unless carefully removed. They generally have a broad attachment to the under surface of the sphenoid, and often run forwards on to the posterior part of the roof of the nose. They are usually firm and contain large blood-vessels, especially venous sinuses, and the vessels do not lie in a sheath and therefore do not retract when divided ; hence, incision into one of these naso-pharyngeal polypi is usually followed by furious bleeding, which does not cease spontaneously. The naso-pharyngeal polypi grow with varying rapidity according to their nature. They fill up the naso-pharynx, bulge down the soft palate and may even escape behind the latter and project into the pharynx itself ; they also grow forward into the posterior part of the nose. The surface frequently becomes abraded, and severe bleeding is common. Hence, it is necessary to attempt the removal of these tumours whenever this is possible.

**TREATMENT.**—Attempts have been frequently made to remove these tumours by means of a wire loop, an *écraseur*, or the galvanic wire, but they are not to be recommended. Apart from the difficulty of getting the loop round the base of the growth, the great objection is, that only the neck of the tumour is cut across and the base is left behind and bleeds severely, and later it tends to grow quickly. Hence, in most cases, it is well to expose the base of the tumour more thoroughly, and remove it along with the periosteum from which it grows.

We shall here indicate the chief routes by which the polypi can be got at ; the actual details of these operations need not be given, because there is no urgency in the operation, as a rule, and the various plans can be considered at leisure.

In one set of operations, the tumour is got at *through the mouth*. Of these probably the best is that introduced by Nélaton, which consists









stitches. In performing the operation the tip of the tongue should be lifted up with two fingers of the left hand so as to make the frenum taut, and the latter is snipped across with a pair of blunt-pointed scissors. The two fingers of the left hand then push the tip of the tongue forcibly back so as to enlarge the incision thus made without running the risk of dividing any of the veins that a more extensive incision would involve. In the less severe cases in which stitches are not required, no anæsthetic is necessary, as the entire procedure occupies only a few seconds. No special after-treatment is called for.

## INJURIES.

### WOUNDS.

The most common wound of the tongue is *laceration* from a bite, such as frequently occurs in epileptics, the tongue being protruded between the teeth and bitten as the jaws come together during the convulsion. This accident sometimes occurs when a child is running with the tongue protruded and falls upon the chin, snapping the jaws together and biting the tongue. *Incised wounds* of the tongue are rare.

**TREATMENT.**—In epileptics the frequency of this occurrence must be borne in mind, and when a fit is imminent, a cork, a roll of bandage, or a piece of wood should be inserted between the teeth, and held there during the fit so as to prevent the tongue being bitten. These injuries usually heal without any trouble, but in some cases severe septic inflammation may ensue. As a rule, the *hæmorrhage* is not severe enough to call for any special treatment for its arrest. When the bleeding is serious the patient should be placed in a good light, the mouth opened wide, the tongue protruded and the cut surface dabbed over with a pledget of wool soaked in a 10 per cent. solution of cocaine. Any spouting vessel should be seized in artery forceps and tied with catgut; if the surface simply oozes, a pledget of wool soaked in adrenalin chloride (1 in 1000) applied to the surface, or a piece of ice wrapped in muslin and placed in the mouth, will check it readily. When the wound is large, it is a good plan to put in a few catgut *stitches* deeply through its edges so as to press the lateral surfaces together; this arrests the bleeding and closes the wound.

*An antiseptic mouth-wash* (e.g. equal parts of a saturated boric solution and water, a tablespoonful of sanitas to the pint of water, or a weak solution of permanganate of potash) should be used at frequent intervals. For forty-eight hours the patient should be kept on a fluid or semi-fluid diet, which is passed along the sound side of the mouth, the head being held over to that side in order to facilitate the passage of the food; immediately afterwards the mouth should be rinsed with the mouth-wash prescribed.



the tongue. A *purge* (calomel gr. v or mist. alb. ℥jss) should be administered, and an *antiseptic mouth-wash* (boric acid, sanitas, or Condyl's fluid), as hot as the patient can bear it, should be used every half hour. If the case is acute, but without embarrassment to respiration, four or five *leeches* (see Vol. I. p. 5) may be applied externally over the hyoid region. Should these measures fail to relieve the swelling, or should the latter become so marked as to give rise to dyspnoea, the best plan is to make *free incisions* into the tongue under a general anæsthetic; gas or gas and oxygen will usually suffice. The incisions should be made on the dorsum of the tongue, on one or both sides, according as half or the whole is affected, and should run parallel to the long axis of the tongue throughout its whole length, extending well down into the muscular tissue. Bleeding should be encouraged by the employment of *hot boric mouth-washes*. The object of the incisions is to favour free escape of the œdematous fluid, and so diminish the swelling of the tongue.

**Abscess of the Tongue.**—Abscess most commonly forms between the genio-hyoglossus muscles, so that by pulling up the tongue with forceps, incising the mucous membrane a little to one side of the middle line (taking care to keep well internal to the ranine artery), and then pushing sinus forceps into the substance of the tongue in the direction of the abscess, the pus can be evacuated. A free opening should be made and the wound kept open by introducing a strip of gauze into the cavity; this should be changed twice daily until the cavity has contracted sufficiently. The condition will subside quickly unless the infection is streptococcal, when the condition known as Ludwig's angina (see Chap. X.) may set in.

#### ACUTE SUPERFICIAL GLOSSITIS.

1. The most common form of acute superficial glossitis is that met with in connection with the growth of the 'oïdium albicans' in the mucous membrane in children and weakly adults—the affection known as '*thrush*.' In this condition whitish spots appear on the mucous membrane of the tongue, palate, cheek, tonsils, or pharynx; they increase in size rapidly, and coalesce to form fairly large patches. The patient generally feels ill, and there is usually diarrhoea. In adults the affection is most common in those who are prostrated by severe disease such as phthisis.

2. Acute superficial glossitis often accompanies ulceration of the mucous membrane of the mouth—the so-called *ulcerative stomatitis*.

3. An eruption of *herpes* may occur on one half of the tongue leading to a superficial inflammation accompanied by the formation of vesicles and minute ulcers.

Acute superficial glossitis may also occur in connection with *foot-and-mouth disease*.



up on the surface in other parts of the tongue, and then the patch appears bluish or (where the epithelium is thicker) whitish, and is often indurated and fissured. The affection generally occurs between the ages of forty and fifty, and is more frequent in men than in women. It is usually attributed to long-continued irritation of the tongue. Smoking, alcohol and the irritation of carious teeth are potent factors in its production. Syphilis predisposes to it in a marked degree, and it is always well to examine the blood for the Wassermann reaction in every case that comes under notice, as the syphilitic cases are often greatly benefited by the administration of salvarsan.

The disease is very important on account of the complications which are apt to arise. Treatment has little effect, except in the earlier stages of the syphilitic cases, and the tendency is for the trouble to spread over the whole tongue; the mucous membrane of the cheek may also be affected. The patches, which at first are small and of a bluish tint, generally thicken, and in long-standing cases the condition described as 'ichthyosis linguæ' may occur, and may be accompanied by widespread cracks and fissures. After the condition has remained stationary for years, warty growths may develop, which, although non-malignant at first, are very likely to become the seat of epithelioma. In other cases, one of the fissures deepens, its edges harden, and epithelioma develops. It is on account of this great liability to the development of epithelioma that the disease is so important, for the subjective symptoms are usually slight, and in the milder cases the condition is only discovered by accident.

**TREATMENT.**—On account of the great risk of epithelioma in these cases, care must be taken to avoid irritation of the inflamed surface. For example, smoking, the free use of alcohol, and the consumption of very sweet or highly spiced foods should be prohibited; possibly the use of mild tobacco may be allowed to habitual smokers, but it is best to give it up completely. The diet should be regulated and any dyspeptic condition treated. All stumps, rough teeth, or badly fitting tooth-plates must be attended to, because it is generally in connection with some injury from these causes that the epitheliomatous condition arises. All patients whose blood reacts positively to the Wassermann test should at once undergo treatment by salvarsan (see Vol. I. Chap. XI.).

Caustics and irritants should be avoided, and the local treatment should consist essentially in *soothing applications*. Alkaline mouth-washes, such as bicarbonate of soda (gr. x–xv to the oz.), chlorate of potash (gr. v–xv to the oz.), and applications such as glycerinum boracis, or glycerinum acidi carbolici (diluted to 1 in 40) may give much relief. Salicylic acid and strong solutions of chromic acid cause irritation and should not be used. Butlin advocated the employment of ointments containing drugs such as borax, cocaine or morphine, in a basis of two





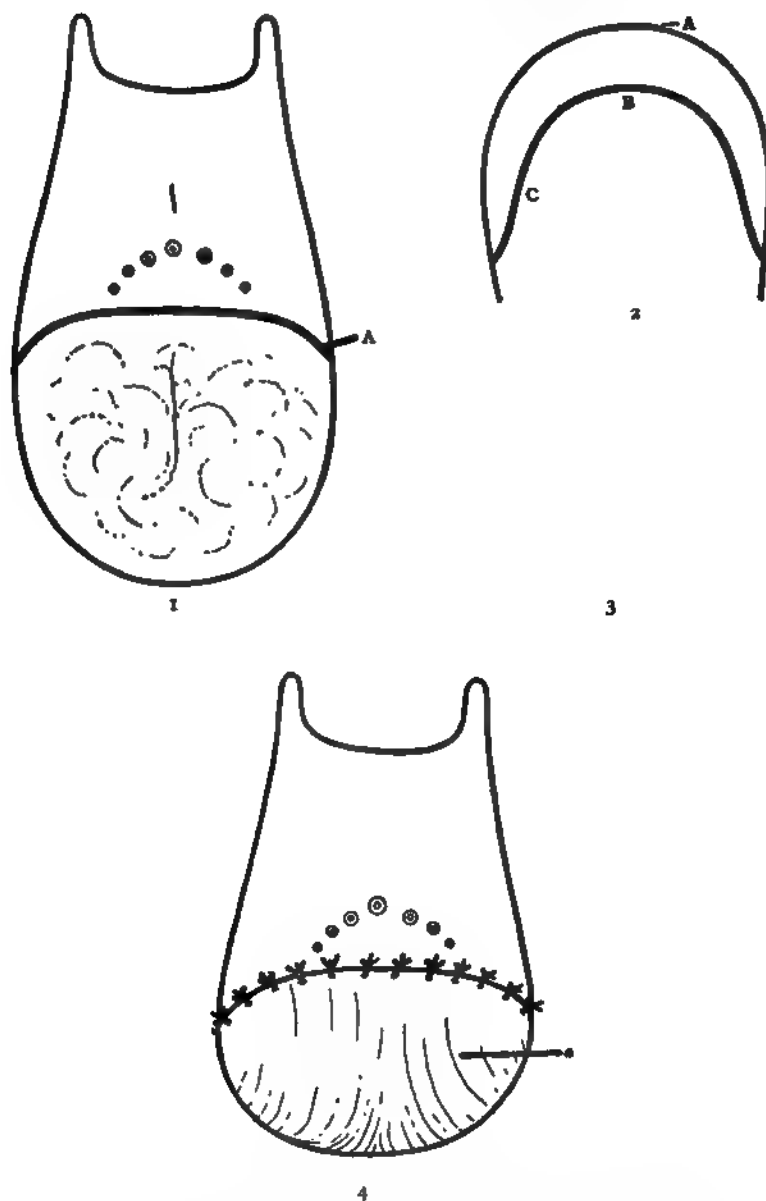


FIG. 26.—EXCISION OF LARGE AREAS OF LEUCOPLAKIA FROM THE TONGUE.  
 1. The curved incision (A) across the dorsum, well behind the leucoplakic area.  
 2. (A) Anterior margin of the tongue; C, the incision, turning down the flap c.  
 3. Transverse section of the tongue showing (c) the mucous membrane of the under surface of the tongue turned down as a flap, and (b) the muscular fibres of the tongue cut across transversely on the level of the incision A in 1.  
 4. The completed operation. The flap of mucous membrane (c) from the under surface is brought up and sutured to the incision on the dorsum. The tongue is thus considerably shortened, but is freely movable.—*Bull.*



latter condition must receive the treatment appropriate to the particular form present. The most useful drugs are bismuth, bicarbonate of soda, rhubarb, and gentian; but of course these must be varied according to the essential nature of the disease, and the diet must be regulated accordingly: the food should be soft and non-irritating. It is well to clear out the bowels in the first instance and to see that they are moved daily.

In the *local treatment* frequent cleansing of the mouth with gargles of sanitas, chlorate of potash, or boro-glyceride will be necessary. If the ulcers are painful, touching them occasionally with 2 per cent. solution of chromic acid, or with nitrate of silver fused on the point of a probe, will often give relief. If healing is slow, astringent lotions such as weak solutions of alum (gr. ij–v to the oz.) may be employed, and iron should be administered internally in the form of pil. ferri (gr. v–xv t.d.s.) or syrup of the iodide of iron (3ss–3j). The teeth should be attended to, and if there is any pyorrhœa present it must be treated.

#### THE LEUCOPLAKIAL ULCER.

It is not uncommon for ulceration to occur about the centre of leucoplakial patches in cases of chronic superficial glossitis. The ulcers are usually very sensitive and difficult to get rid of. They generally take the form of fissures of varying depth, in which epithelioma is prone to develop. These ulcers are difficult to treat, and often remain unhealed for a long time; owing to the thickness of the tissues around, they may present all the appearances of a callous ulcer.

**TREATMENT.**—All causes of irritation must be removed, and antiseptic and astringent mouth-washes, such as alum or tannin (gr. ij–v to the oz.), should be employed. In patients under middle age, a solution of chromic acid (commencing with 2 per cent. and increasing up to 10 per cent.) may be painted on the ulcer once daily. In chronic cases it is best to excise the ulcer as soon as it is found that it will not heal under careful treatment. When the sore is the centre of a limited patch of leucoma, excision of the entire patch along with the ulcer is advisable, and should be done in the manner described for leucoplakia (see p. 59).

#### THE MERCURIAL ULCER.

This is merely an exaggerated stage of mercurial stomatitis, and is rarely seen nowadays; it was fairly common formerly and resulted from an unduly free use of mercury.

**TREATMENT.**—The immediate disuse of the drug is obviously called for, whether it has been given internally for syphilis or whether the affection occurs in a patient working with mercury. A course of saline

aperients should be given, and a mixture containing 10–15 grains of chlorate of potash should be administered three times a day. At the same time careful attention to the hygiene of the mouth is essential, the teeth being frequently cleansed with a tooth-powder containing chlorate of potash, carbolic acid, and some astringent, such as catechu.

## CHAPTER VII.

### SYPHILIS AND TUBERCULOSIS OF THE TONGUE.

#### SYPHILIS.

LINGUAL syphilis is very common, and all stages of the disease may be met with.

A *primary chancre* is rare on the tongue ; when it affects the mouth it generally occurs on the lip or in the region of the tonsil. On the tongue it is usually situated towards the tip or the anterior part of the dorsum.

*Mucous patches* are extremely common in the course of secondary syphilis, and may be met with on any part of the tongue, most frequently about its borders. They may occur also in the congenital form of the disease and are usually multiple and accompanied by other manifestations of the disease elsewhere. The patches vary in appearance according to their situation ; on the side of the tongue, they form elongated or oval areas and are often fissured or ulcerated in the centre and very painful ; on the dorsum the ulceration is not so marked, and the patch is generally smooth, with whitish margins ; on the under surface of the tongue they may present the warty appearance of the typical mucous patch.

In tertiary syphilis *sclerosing glossitis* (localised areas of inflammation with thickening of the tissues beneath) or typical *gummata* may be met with. The first form causes deep fissures and ulcers on the tongue which are very typical. In the earlier stages they give rise to thickened patches of variable size with a white appearance, which somewhat resemble leucoplakia ; these areas are often fissured or ulcerated.

The most frequent form of tertiary lesion is a *gumma*. Gummata occur either on the surface of the tongue or deep in the muscular tissue ; the more deeply seated forms are usually near the middle line. They may be single or multiple, and gradually break down and lead to a comparatively deep conical ulcer, with a foul sloughy surface, and without the hard everted edge that is typical of epithelioma. There is often



elapse before the diagnosis is certain, and time is of such great importance in these cases that the most rapid and certain means of coming to a decision must be employed.

### TUBERCULOSIS.

This condition closely resembles that occurring on the lower lip (see Vol. III. p. 463). The ulcers may be primary, or secondary to tuberculous disease elsewhere ; the primary form is extremely rare. In most cases ulceration occurs in the subjects of phthisis or of tuberculosis of the larynx or pharynx, and is usually connected with some injury, such as the irritation of a rough tooth.

The ulcers are extremely painful, and may give rise to great difficulty in eating and swallowing. They usually occur about the tip of the tongue, although they may appear on the dorsum farther back. They vary from a crack at the tip of the tongue with hard edges—on separating which a deep fissure may be found—to a superficial erosion beginning as a small vesicle. As the ulcer increases in size, it becomes irregular in shape, and its surface is pale and flabby, and generally covered with yellowish grey mucus. The edges are not much undermined ; they are often sharply cut and redder than the surrounding parts. The ulcer is superficial at first, but extends more deeply as it increases in size. The tongue is generally swollen.

**TREATMENT.**—Radical measures are indicated when the ulcer is small, single, and unaccompanied by advanced tuberculous disease elsewhere, and they are especially applicable in the case of the ulcers on the tip of the tongue, which cause intense pain on mastication or articulation. The more extensive tuberculous ulcers, associated with similar disease in the larynx or lungs, should, however, not be excised unless they are causing great pain ; excision would mean an extensive operation, whilst the cut surface would be liable to become infected. When, however, the disease in the lungs is quiescent, it is of advantage to remove the ulcer, even though it be extensive. The ulcers should not be excised when they occur in the neighbourhood of the base of the tongue.

The best method of removing the ulcer is by a wedge-shaped excision, the cut edges being accurately stitched together afterwards. It is useless to excise the ulcers and to leave a raw surface, as re-infection would almost certainly occur. The operation is described on p. 59. The hygiene of the mouth should be attended to before it is undertaken. Afterwards antiseptic mouth-washes should be employed.

When a radical operation is not advisable, an attempt may be made to remove the infected surface of the ulcer, but in many cases it will be necessary to be content with measures designed merely to relieve the pain and inconvenience in mastication and articulation. Unless the patient is profoundly ill, it is best to remove the surface of the ulcer,

and this may be done without a general anæsthetic, although the use of one is more satisfactory. The ulcer is mopped over with a 10 per cent. solution of cocaine (to which a few drops of adrenalin chloride are added), and its surface is carefully scraped with a small sharp spoon, and afterwards sponged over with undiluted carbolic or lactic acid (see Vol. III. p. 463). This may be repeated if necessary at intervals until healthy granulation occurs. A mouth-wash of boro-glyceride or sanitas may be used after the operation; one of alum or tannin (gr. ij-v to the oz.) should be substituted if healing is slow. The constitutional treatment of tuberculous disease (see Vol. I. p. 231) should be carried out.

When the ulcer is too extensive or the patient is too weak for this treatment, the surface of the ulcer may be painted over with a 20 per cent. solution of lactic acid every alternate day. If the pain is very severe orthoform may be powdered on the ulcer shortly before meals, so as to relieve the pain. Should this fail, the local application of a 10 per cent. solution of cocaine should be prescribed. As an alternative in severe cases, a sixth of a grain of morphine mixed with a little boric acid may be dusted on the ulcer after its surface has been dried.



## CHAPTER VIII.

### NON-MALIGNANT TUMOURS OF THE TONGUE.

SIMPLE tumours of the tongue are rare. *Lipomata* and *fibromata* are sometimes met with and must be enucleated if the diagnosis is made ; in a doubtful case it is advisable to cut down and ascertain the nature of the growth before performing a set excision, as the simple removal of a non-malignant tumour will suffice for a cure.

#### NÆVUS.

Nævus of the tongue may be either *capillary* or *venous* ; it is usually unilateral. These tumours may not give rise to any trouble if they are small, the chief accident to which the patient is liable being hæmorrhage if the growth is injured ; septic thrombosis may follow the injury. When, however, a venous nævus affects a considerable area of the tongue and increases in size, great enlargement of the organ ensues and the tongue constantly gets in the way of the teeth and is wounded, the patient being thus exposed to the risk of serious hæmorrhage and septic infection.

**TREATMENT.**—This must vary with the extent and progress of the affection and also with its situation. *When the nævus is stationary and is situated on the dorsum*, there is rarely any need for operative interference. The tumour should be watched, and should only be operated upon if it increases in size. Should it do so, the best plan, when the growth is quite small, is to destroy it with the actual cautery at a dull red heat so as to sear the vessels and not to cut through them.

*When the nævus is on the side of the tongue and is small*, it is liable to be bitten and it should be excised, even though it may not be increasing in size. This can be done by a wedge-shaped incision so planned as to go well clear of the dilated vessels. A few ligatures may be required, but as a rule the hæmorrhage soon ceases when the sides of the wedge are brought together by catgut sutures inserted deeply. Before inserting the



hypoglossal nerve backwards ; this will bring him to the external carotid artery from which the lingual artery arises.

In spite of preliminary ligature of the lingual, however, the bleeding during the removal of the nævus may be profuse, so that, in very extensive cases, it is well to control the circulation by temporary ligatures passed through the substance of the tongue well beyond the area of excision. After the nævus has been removed and the larger vessels have been tied, oozing is arrested by the sutures which bring the edges together and which should be inserted deeply through the wound and tied firmly. Occasionally, however, it may be found necessary to apply the actual cautery before the temporary ligatures are removed.

### LYMPHANGIOMA.

This is the usual cause of the condition known as '*macroglossia*' the typical form being a congenital lymphangioma of the tongue. The superficial vessels are usually dilated and tortuous and give rise to vesicles on the surface of the organ towards the tip and edges. At first the tongue is soft and does not cause much inconvenience, although it occasionally swells and becomes inconveniently large. The superficial dilated lymphatics are easily injured, and injury may be followed by inflammation of the tongue and considerable thickening ; as a result the tongue is liable to repeated inflammatory attacks which leave the organ firmer, harder and larger than before. After a time the tongue may become too large for the mouth and be firmly pressed against the teeth of the lower jaw ; it may even hang out of the mouth permanently. As a result, the pressure on the lower jaw causes the alveolar border and the teeth to project forwards, and this deformity becomes irremediable if it is allowed to persist. The patient may also suffer from difficulty in breathing, masticating and swallowing. A similar condition may be met with in von Recklinghausen's disease.

**TREATMENT.**—In former days, ignipuncture, electrolysis, or scarifications were employed, but they never cure the condition, and only serve to set up inflammation and increase the growth of the tongue. The only method which promises success is *excision of wedge-shaped portions* of the organ including as much as possible of the lymphangiomatous mass. These operations are no doubt dangerous and may be followed by severe lymphangitis, just as are operations for hydrocele of the neck and other lymphangiomatous tumours. When, however, repeated attacks of inflammation have occurred and a typical macroglossia has been produced, the lymphatics are widely blocked already and there is not the same risk of spreading lymphangitis. Notwithstanding this risk the condition of the tongue is far too serious to be left alone.

*Before operation* the mouth must be cleansed, all fur removed from the tongue, and the teeth scaled and cleaned. A wedge-shaped portion



case if it extends deeply into the base of the tongue and gives rise to much enlargement there, it will be advisable to give the patient a general anæsthetic, and then either perform a preliminary laryngotomy and plug the pharynx, or have the head hanging well down so that any blood will collect in the naso-pharynx. The tongue is pulled well forwards by means of a clip or tongue-forceps, and an elliptical incision is made through the mucous membrane of the tongue enclosing the base of the tumour, but not incising it. Good reflected light or a powerful forehead lamp is required, as the tumour must not be injured. Then, with a blunt dissector, the growth can be shelled out without serious bleeding, and the cavity which is left should be obliterated by a few catgut sutures inserted deeply so as to arrest bleeding and secure coaptation.

Should myxœdema ensue, the patient must be treated by means of thyroid extract (see Vol. V.).

### PAPILLOMATA.

Warts are not uncommon on the tongue, and are important mainly because they may be followed by epithelioma. They are usually pedunculated and occur on the dorsum ; they may also be met with beneath the tongue in the neighbourhood of the frenum. The warty condition of the tongue associated with leucoma is referred to on p. 58 ; in that condition the warts are usually sessile and are very liable to be followed by epithelioma.

**TREATMENT.**—Removal is imperative and is usually easy. The best method is to enclose the base of the wart in an elliptical incision carried into the substance of the tongue in a wedge-shaped manner, so as to allow the edges of the wound to be stitched together with catgut afterwards. This operation is best performed under general anæsthesia, but local anæsthesia by cocaine, applied both locally to the surface and injected into the tongue, may be employed ; the objection to it is the difficulty of controlling the movements of the tongue.



indurated without any marked ulceration and without being warty, and the disease progresses slowly and resembles in its characters the atrophic scirrhus of the breast.

The cancer is at first superficial and the patient's attention may only be drawn to it by some slight pain or interference with mastication or articulation. The disease spreads not only superficially along the mucous membrane, but also deeply into the muscles, and before long this leads to difficulty in protruding the organ ; this is most marked when the disease occurs far back.

When the growth is situated on the edge of the tongue or floor of the mouth, it spreads not only on to the dorsum, but also, and often chiefly, along the floor of the mouth and thence to the mucous membrane covering the lower jaw, the periosteum and bone being soon affected.

When situated at the back of the tongue, the growth spreads to the mucous membrane of the floor of the mouth, to the tonsil and anterior pillar of the fauces, the pharynx, and the orifice of the larynx, and upwards on to the soft palate ; so that in cases of extensive cancer of the base of the tongue there may also be disease of the tonsil, fauces, and soft palate. In other cases the disease in the tongue in this situation is secondary to a primary focus in the palatal or tonsillar regions.

When the growth spreads from the tongue to the floor of the mouth or commences in the latter situation, it affects the lymphatic glands early, and the sublingual salivary glands also become infiltrated. Removal of the tongue alone, even at a very early stage, seldom arrests the disease altogether. It may not recur in the mouth, but it almost invariably does so in the neighbouring lymphatic glands.

The greater severity of the disease when it occurs in the tongue may be partly due to great suitability of the soil for the growth of epithelium, but is also partly the result of the early infiltration of the lingual muscles. When cancer attacks a muscle it soon becomes diffusely distributed over it by way of the lymphatic vessels as a consequence of the muscular movements. In cancer affecting the side of the tongue, the hyoglossus is liable to early infiltration, while in the more centrally and deeply situated growths, it is the genio-hyoglossus that is most involved. This point has a most important bearing on the extent of the operation necessary in these cases, and more especially on the question of partial operations.

*The lymphatic glands first affected* vary according to the seat of the primary disease in the tongue. In *cancer of the tip, the frenum and the anterior part of the floor of the mouth*, the submental glands are first affected, and after them those in the submaxillary region. In *cancer of the middle of the tongue and floor of the mouth*, the glands in the submaxillary region will generally be first enlarged. The submaxillary salivary gland itself usually escapes, but there are lymphatic glands in intimate connection with it which soon become enlarged. The disease





the seat of epitheliomatous ulceration. Bleeding is common from these deep ulcers, and may be severe.

In the case of patients who have not been operated upon, the disease generally causes death within a year, or at the most within eighteen months. The cause of death is usually exhaustion due to gradual emaciation, profuse discharge and hæmorrhage from the ulcer, and difficulty in taking food. The final result is often brought about by a low form of pneumonia. Occasionally there are profuse hæmorrhages from the ulcer in the mouth or in the neck, but as a rule the hæmorrhage is not severe, and only contributes indirectly to the death of the patient.

**TREATMENT.**—The first and most important point in the treatment is to decide which cases are operable and which are not. The growth in the mouth should always be removed when it is possible to do so, because even though recurrence should take place in the glands, the termination will be much more easy if the mouth remains free from disease.

**The choice of cases for operation.**—The chief points which determine the suitability of any given case for operative treatment are the extent and situation of the growth in the mouth, the degree of implication of the glands in the neck and the general condition of the patient. We shall consider these questions in the above order.

*The extent of the disease in the mouth* only influences the question in so far as the possibility of complete removal of the primary disease is concerned. When we consider the sufferings which a patient dying from cancer of the tongue has to undergo, sufferings which are largely attributable to the foul mass in the mouth, it is obviously the surgeon's duty to attempt the removal of the primary growth, even when the area of healthy tissues around the disease is comparatively slight, and when therefore there is a considerable risk of recurrence. This argument must not, however, be carried too far, for there can be no object in cutting into the mouth when the disease is so extensive that it is obviously impossible to remove it entirely. For instance, if the tongue is infiltrated with cancer which has extended so far on to the floor of the mouth as to fix the organ, no good can result from operation, seeing that only a portion of the growth can be taken away.

*The situation of the disease in the tongue* is of importance. A comparatively extensive growth situated on the anterior part of the organ may be removed with a fair prospect of success when a much less extensive mass in the posterior half should be left alone. Some surgeons hold that extension of the disease from the tongue to the tonsillar region contraindicates operative interference, but, although it undoubtedly increases the gravity of the operation, we are not inclined to look upon these cases as necessarily inoperable. We have operated on cases in which the growth extended on to the soft palate and the pharynx, and have been able to remove the disease completely. If, however, the whole base of the tongue is involved and the mischief extends across the middle line, the



permit complete extirpation, and therefore it is important to cut down and ascertain the exact condition of affairs under these circumstances. A comparatively slight dissection will show whether removal is feasible or not, and, if the case is found to be inoperable, the wound can be closed without risk to the patient. Involvement of the carotid artery and the vagus nerve are rare except when there is extensive infiltration of the neck—when the mass will be completely fixed and there will be no lateral mobility—and ligature of the carotid artery with its serious symptoms due to imperfect blood-supply to the brain will therefore practically never be called for. Removal of portions of the vagus, on the other hand, does not seem to be attended by any particular danger. It has been done more than once accidentally, and in one case in which we found the carotid artery unaffected, but the vagus infiltrated with disease, two inches of the nerve were removed designedly, and the patient was none the worse. If, however, the disease involves the artery, we should consider the case inoperable.

Should there be extensive involvement of the glands extending well down into the root of the neck, so that it is obvious that those in the thorax must also be affected, or should the glandular enlargement infiltrate the skin, thereby showing that the disease has passed beyond the limits of the gland, operation must be looked upon as out of the question.

Extension of glandular disease beneath the sterno-mastoid muscle, although it makes complete removal more difficult, does not necessarily contra-indicate operation. On the other hand, extension upwards into the parotid region is a much more serious matter, inasmuch as, owing to the anatomical conditions, the chances of removing all the affected glands are very slight.

*The general condition of the patient* will influence the decision to some extent. It is rare for metastasis to occur in cancer of the tongue, although secondary deposits have been found in the lung and liver. Either the disease does not spread by the blood-vessels or else the patient dies before it has had time to establish itself elsewhere; the presence or absence of metastatic deposits therefore does not, as a rule, affect the question of operation. But after operation for cancer of the tongue, a wound is left which must become septic, and the chances of recovery must depend, to a great extent, on the patient's power of resisting septic infection, and therefore his general state of health is a matter of great importance. Alcoholics, for instance, stand these operations badly, particularly when the area involved is the base of the tongue, and it is not advisable to undertake extensive operations in habitual drunkards, even though they have no albuminuria or definite visceral disease. The operation is frequently followed by an attack of delirium tremens, and, moreover, the tissues of these patients seem peculiarly unable to resist sepsis, so that the chances of a fatal result are great. There would be the same hesitation in operating upon the subjects of albuminuria or diabetes.



on the tongue, and when consequently this wound communicates freely with the mouth, we prefer to ligature the lingual artery as it is divided in the tongue, because the whole wound in the neck must necessarily become septic, and the ligature on the lingual trunk near its origin from the carotid is certain to separate, and its separation is likely to be followed by secondary hæmorrhage. This occurs usually about the tenth day, when the patient is otherwise fairly well and is probably not under careful supervision, and he may die before assistance can reach him, death ensuing either from loss of blood or from the blood finding its way into the trachea. In order to stop the hæmorrhage it will be necessary to tie the external or the common carotid arteries, either of which operations may be followed by disastrous results—the ligature of the external carotid probably by secondary hæmorrhage, as it will be tied in a septic wound, and ligature of the common trunk by fatal cerebral symptoms. Under these circumstances, therefore, we prefer to tie the terminal branches of the vessel rather than to ligature it in continuity at its origin.

*Asphyxia* from the passage of blood into the trachea is usually comparatively easily avoided. The patient should lie with the face turned a little towards the sound side, the lower angle of the mouth being firmly pressed down by an assistant's fingers so that the blood runs first into the hollow of the cheek and then out of the mouth. Some surgeons, however, raise the head and shoulders of the patient, and throw the head forwards, so that the blood shall run directly out of the mouth. This risk may be altogether avoided by performing a preliminary laryngotomy (see p. 33) and plugging the pharynx firmly with a large sponge attached to a long tape, the end of which hangs out of the mouth and is secured by forceps. This operation does not materially increase the risks, and has the great advantage of enabling the surgeon to disregard the oozing and to concentrate his attention entirely on the removal of the disease—a point of the highest importance when it is situated far back. The constant sponging necessary to prevent blood running into the larynx is calculated to flurry the surgeon, and the result is that he does not cut sufficiently wide of the disease, and the whole object of the operation is defeated. Hence, except when the disease is limited to the tip of the tongue, it is advisable to perform a preliminary laryngotomy. The intratracheal method of administration of anæsthetics described on p. 33 also prevents the entrance of blood into the air-passages.

**Remote dangers.**—These are mainly *septic risks*, and it is of the highest importance to adopt measures to minimise them. The most serious risk of sepsis occurs in operations about the base of the tongue, and in the cases in which it is deemed advisable to practise an extensive removal of the cervical glands at the same operation as that in which the disease in the tongue is removed; the latter necessarily opens up the cellular planes and establishes a direct communication with the buccal cavity.

In spite of the fact that the operation is done in a septic cavity, it is



these wounds in the mouth can be closed they heal rapidly, and therefore we always attempt to arrange the incisions so that part of the wound, at any rate, can be stitched up. When only half the tongue is removed this is done by dividing the tissues somewhat obliquely, so as to leave small flaps of mucous membrane above and below, which can afterwards be approximated by catgut stitches. A considerable amount of mucous membrane can often be saved in this way, and we regard it as a point of special importance in cases in which the wound is near the root of the tongue and the tonsillar region, and in which accumulation of putrefying discharges is extremely likely to give rise to septic cellulitis and pneumonia. In the majority of cases it is impossible to stitch up the wound completely, but even partial closure (especially when it can be done towards the back of the throat) not only diminishes the risks of sepsis, but also enables the patient to swallow and to move the tongue much better than he otherwise could. Moreover, if the tip of the tongue can be stitched over, it does not become bound to the floor of the mouth in the same way that it does when a large raw surface is left, nor will there be so much interference with speaking and swallowing.

A useful precaution against sepsis is to *swab out the wound and all its recesses with a solution of chloride of zinc* (gr. 40 to the oz.) at the end of the operation. This closes the routes of absorption to a considerable extent and thus delays the onset and spread of sepsis.

The septic troubles are chiefly cellulitis, acute septicæmia, and septic pneumonia. Acute septicæmia is the most common, and this is the reason why we lay so much stress upon the importance of local precautions. Once septic pneumonia is established there is practically no hope for the patient.

**The treatment of the glandular area.**—In operations for cancer of the breast it is the accepted practice that the entire glandular area in the axilla, and also the lymphatic tracts between the tumour and the glands, must be cleared away. The question arises whether this should be done in cancer of the tongue. In cancer of the breast there are almost invariably plugs of cancerous cells in the lymphatic vessels running from the breast to the infected glands; were the latter alone removed, the disease would be very apt to recur in the lymphatic vessels, especially over the pectoral fascia. This infection of the lymphatics apparently does not occur to the same extent in cancer of the tongue, and it is usually only in advanced cases that there is an infection of the tissues between the tongue and the glands, and then it probably arises from direct extension. Hence it is not always necessary to remove the tissues between these two structures, in other words to cause the wound in the mouth to communicate with the triangles of the neck.

Another question of importance is whether the fat and glands should be removed from the anterior triangle, as is done in the axilla, when no glandular enlargement can be felt at the time of the operation on the





the planes of the neck is very likely to occur. In these cases, therefore, it is well to divide the operation into two stages, allowing a week to elapse between each, and the question then arises as to which operation should be performed first, the removal of the tongue or that of the glands. The answer will depend on the part most affected. In bad cases such as these, the process usually spreads much more rapidly in the glands than in the tongue, and it will generally be found advisable to remove the glands first, and to leave the excision of the tongue to a later period. It is only when the disease in the mouth is extensive and the glandular affection is not marked that the reverse procedure is advisable.

#### THE OPERATIONS UPON THE TONGUE.

We shall consider first the methods for the removal of the disease in the tongue and afterwards those for the extirpation of the glands from the neck.

Many operations have been recommended for cancer of the tongue, and different cases require different methods, the particular one employed depending partly on the situation and partly on the extent of the disease. When the growth is limited to the anterior part or the border of the tongue, a much less severe operation will be required than when it is situated in the neighbourhood of the pillar of the fauces, and the same will be the case when there is only superficial disease and the growth has not yet penetrated into the deeper muscles of the tongue, as compared with marked infiltration of the latter. When the disease has not extended into the deeper muscles, it is often sufficient to take away only the affected area along with a suitable amount of healthy tissue around. In this way a great part of the organ can be preserved and its usefulness is not materially interfered with. When the disease is well to one side, the tip of the tongue may be left intact, and this is a matter of much importance for the subsequent power of articulation. On the other hand, when the disease has penetrated into the muscles, one half of the tongue at least must be removed right back to the base, because the majority of the lymphatics run parallel with the muscular fibres, and every movement of the muscle forces on the lymph; hence a muscle infected by cancer should be looked on as diseased throughout its whole extent and should therefore be removed as freely as possible.

The procedures that may be adopted for the removal of the tongue are (1) cutting out the growth along with a certain amount of the tongue from within the mouth—the intra-buccal methods; (2) those in which this procedure is only feasible after gaining extra room, for example, by splitting the cheek; (3) removal of the tongue after dividing the symphysis or some other portion of the lower jaw, and pulling the two halves of the bone asunder; and (4) removal of the organ through incisions made entirely beneath the jaw—the type of which is that known







sandbag and the head turned fully over to the sound side. The mouth is widely opened with a self-retaining gag such as Lane's (see Fig. 27, B), which does not slip, takes up very little room and is applied far back on the sound side so as to keep the angle of the mouth wide open and thus allow the blood to collect in the hollow of the cheek, and subsequently run out of the mouth. A large retractor at the opposite angle of the mouth pulls the cheek well back so as to expose the buccal cavity thoroughly. A good light is essential and the patient should either face a window or artificial illumination should be used. A preliminary laryngotomy is advisable in the more advanced cases, and then the pharynx should be packed with sponges. The anæsthetic should be

chloroform. A silk ligature is passed through the base of the tongue on the sound side in the manner described on p. 85, and the tip of the half that is to be removed is pulled out with tongue-forceps (see Fig. 30), the tip on the other side being seized with catch-forceps. The surgeon takes charge of the tongue-forceps, while the ligature and the catch-forceps are entrusted to an assistant, whose duty it is to pull the tongue well forward and to keep the mouth sponged well out; he should be provided with plenty of sponges on holders or forceps. The tongue can be pulled out still farther by dividing the frenum and the anterior pillars of the fauces on each side. This is done by clipping each with scissors and enlarging the gap by the fingers.




FIG. 30.—REMOVAL OF ONE HALF OF THE TONGUE BY THE INTRA-BUCAL METHOD. A suture is inserted through the tip of the half to be removed, and another through the base of the opposite half. The tongue is split in the middle line, and the dotted line indicates the transverse incision well behind the growth. A retractor should be used to pull back the angle of the mouth on the right side.

The steps of the operation vary somewhat, according to whether the disease encroaches upon the floor of the mouth or not.

*When the disease does not encroach upon the floor of the mouth,* the simplest plan is to begin by splitting the tongue along the raphe right back to the base. The mucous membrane should be divided either with a knife or by running one blade of a pair of sharp-pointed scissors beneath the mucous membrane in the middle line along the dorsum towards the base, and dividing the mucous membrane as it goes; a similar procedure is carried out in the middle line of the under-surface of the tip. The tongue can now be split by seizing one half in each hand and separating the muscular fibres by means of the finger; this method saves considerable bleeding. The surgeon then divides the mucous membrane and the muscles in the floor of the mouth on the affected side by a series of short



which may persist for some time. There is, however, very little arterial bleeding, and practically all fear of hæmorrhage is over as soon as the lingual artery has been controlled. It is well, therefore, to proceed rapidly with the operation, trusting to the fact that the bleeding will cease when the lingual is secured and the organ removed. It is the assistant's duty to see that no danger arises from the presence of blood in the mouth.

After the portion of the tongue has been removed and the bleeding arrested, the wound is swabbed with chloride of zinc solution (gr. 40 to the oz.), taking care to see that the patient does not swallow any of it; no other application to the raw surface is necessary. Any flaps of mucous membrane that have been saved are brought together by catgut stitches. It is especially important, if possible, to suture the mucous membrane on the dorsum to that on the under-surface of the tip of the tongue, so that the latter remains free and is not bound down in the floor of the mouth. It does not matter much if there is considerable tension on the edges of the flaps of mucous membrane which are brought together in order to diminish the raw surface in the mouth. Adhesions will form even if the stitches cut their way through, and some diminution at any rate will take place in the size of the wound during the early stages of repair, when the risk of sepsis is greatest. Of course, the stitching of the wound in the mouth must be done judiciously. It is possible, for instance, to make the tongue unduly long by suturing the mucous membrane over the raw surface too far back; while, on the other hand, if no suturing is practised, the raw surface beneath the tip and that on the floor of the mouth will adhere, so that the organ is tightly bound down and articulation is much interfered with.

The suture is removed from the sound half of the tongue, and the patient is put back to bed, with the head turned well over to the affected side and the mouth somewhat dependent, so that any blood may escape. As soon as the patient has recovered from the anæsthetic he should be propped up in the sitting position, and is generally able to get out of bed in three or four days. The details of the after-treatment are described on p. 99.

(d) **When the disease extends beyond the middle line, but is limited to the tongue**, the entire organ will require removal. This may be done by Whitehead's operation, though we prefer Syme's or Kocher's in these cases. *Whitehead's operation* is described by him as follows (*British Medical Journal*, 1891, vol. i. p. 962):—

A preliminary laryngotomy will obviate all risk of asphyxia, and will be a source of satisfaction to the surgeon, although, as a perusal of the subjoined account will show, it is not essential, especially in the hands of an experienced operator. If this is not done, the administration of the anæsthetic by the intra-tracheal method (see p. 33) is useful.

'The ligature passed through the anterior portion of the tongue is a





drying, finally painting the surface with the iodoform styptic varnish which I introduced in 1881. This preparation, in addition to its antiseptic properties, has the advantage of lessening the discomfort which follows when the surface is left unprotected, and it also enables the patient to take food in the ordinary manner almost immediately after the operation.

'The mercurial solution I prefer is that of the biniodide, and the strength I am in the habit of using is  $\frac{1}{1000}$ . I have recently made, and I think with advantage, a slight addition to the iodoform varnish. My original custom was simply to substitute for the spirit ordinarily used in the preparation of friar's balsam a saturated ethereal solution of iodoform, but now I prefer to mix with the ether one volume in ten of turpentine. This addition has a very marked influence in promptly checking the capillary oozing which occasionally prevents a dry surface being quickly secured.

'I was at one time in favour of suspending all alimentation by the mouth for the first four days, and feeding the patient entirely by nutrient enemata ; but for some years I have entirely abandoned this practice, and I now feed the patient with liquids, by the mouth, as freely and as early as possible, only using enemata when it is necessary to supplement the amount of food the patient is otherwise able to take ; and I find that if a coat of the varnish is applied daily, patients rarely have any difficulty in taking an adequate amount of sustenance. It fortunately happens that the patients appreciate rather than object to the application of the varnish, and they will often ask for its use more frequently than once a day.'

The ligature at the base of the tongue should either be fastened to the teeth or kept hanging out of the mouth by the weight of a pair of forceps.

*Kocher's Operation.*—This is a well-known operation and was at one time widely used. We generally, however, prefer operations such as Langenbeck's or Syme's (see p. 96), in which the jaw is divided, as they give a much better view of the parts than is obtained in Kocher's operation.

In a typical Kocher's operation a *preliminary tracheotomy* is necessary, so as to enable the pharynx to be plugged with sponges. This prevents blood passing into the air passages and also does away with the risk of the epiglottis falling back over the larynx after the entire tongue has been removed ; when the base of the tongue is removed, the orifice of the larynx will almost certainly become blocked and the patient will become asphyxiated unless a preliminary tracheotomy has been done. A laryngotomy opening is too near the area of operation, and blood might get down the tube ; intra-tracheal administration of the anæsthetic (see p. 33) may, however, replace the tracheotomy.

After the tracheotomy tube has been inserted—which should preferably be a Hahn's or Trendelenburg's cannula (see Fig. 31)—the shoulders are raised on sandbags and the head is allowed to hang some-



the tongue, and the affected portion is easily clipped away with scissors, or, still better, divided with the thermo-cautery, well wide of the disease. The arteries are seized and tied as they are divided.

There is no doubt that this is a good method for complete extirpation of the tongue. When the disease infiltrates the muscles down to the hyoid bone, it is easy to leave some portion of it behind in less extensive operations, whereas in Kocher's the whole muscular mass is exposed and the excision can be carried as far back and as low down as may be necessary. But at the same time, it is only essential for those cases in which the infiltration extends far back or deep down, and in which the

whole of the organ has to be removed right back to the hyoid bone. Kocher himself speaks of it as an operation that could be carried out antiseptically. This, of course, is not possible. At the same time, however, the sepsis is more or less superficial and possibly may be kept under control by packing the wound in the mouth with antiseptic gauze; this can be continued as long as a tracheotomy tube is retained.

*Dressings.*—After the tongue has been removed, and the bleeding arrested, the surface of the stump is sponged with a solution of chloride of zinc (gr. 40 to the oz.) and the mouth is firmly packed with cyanide or iodoform gauze. Caution must be observed in using the latter because several cases of iodoform

FIG. 32.—Kocher's Incision for Removal of the Tongue. The dotted line shows the direction in which the anterior triangle may be opened up if necessary.

poisoning have occurred. The external wound is stitched up and one or more drainage tubes are inserted, passing from the most dependent parts of the mouth wound into the neck, so as to carry off all discharge freely. The Hahn's tube is removed, and either a fresh one is inserted for twenty-four hours or an ordinary tracheotomy cannula is substituted, according to the likelihood or not of discharges finding their way through the glottis.

(c) *When the disease extends from the base of the tongue to the surrounding structures.*—Cancer of the base of the tongue, with extension to the floor of the mouth so that the tongue cannot be protruded owing to infiltration of the muscles, cannot be treated efficiently by intra-buccal operations. It is most essential to obtain



and it is not much more troublesome to drill them at the end of the operation.

If the disease encroaches upon the lower jaw itself, it will be necessary to remove a portion of the bone. It is very important not to remove the entire depth of the bone (see p. 45), if it can possibly be avoided, and, while it is still more undesirable merely to peel off the periosteum and remove it in these cases, every legitimate attempt should be made to save some portion of the thickness of the jaw so as to retain the proper form of the bone.

Another condition in which division of the jaw is essential for satisfactory access to the growth is when the latter has spread on to the floor of the mouth in the neighbourhood of the frenum. In these cases there is no possibility of getting sufficiently free access to the back of the symphysis without division of the jaw. For this purpose the operation introduced by Syme is very useful.

*Syme's operation* is performed as follows: The lower lip is split vertically in the middle line and the incision in the skin is carried down to the hyoid bone. It will often be found advisable to continue the incisions outwards on each side

FIG. 34.—LANGENBECK'S METHOD OF EXCISING THE TONGUE. The divided ends of the jaw are pulled forcibly apart and good access is obtained to the side of the tongue and floor of the mouth. The incision is the same as that shown in the preceding figure.

from this point so as to expose the sides of the tongue more freely (see Fig. 35). A central incisor tooth is extracted and the jaw sawn through its socket; the soft parts are separated from the bone and the two halves of the jaw pulled forcibly apart so as to expose the whole of the anterior portion of the floor of the mouth and the tongue, taking care, however, not to tear the growth. The rest of the operation is carried out with scissors, the mucous membrane being divided well free of the growth on either side and close to the jaw, and the tongue muscles snipped through close to the hyoid bone. A thread should be passed through the base of the tongue so as to keep it forward after the disease has been removed. The whole of the affected area of the tongue, including the contents of the submaxillary triangle, is then removed.



of bone must be removed. No risk of recurrence should be run by being too sparing in the removal of the bone. The remarks made on p. 45, with reference to the pitiable plight of patients who have had portions of the lower jaw excised, apply to the cases now under consideration, and the surgeon must always place the full facts of the case before the patient as dispassionately as possible before operation is decided upon.

*Partial excision of the jaw.*—When the disease is situated towards the front of the tongue, spreads over the floor of the mouth and infiltrates

the muco-periosteum and the ramus of the jaw, the best plan, after performing a preliminary tracheotomy, is to make a curved incision with its convexity downwards, commencing close to the symphysis, running down nearly to the hyoid bone and curving upwards to the neighbourhood of the angle of the jaw (see Fig. 36). This flap is then turned up with all the soft tissues on the outer surface of the jaw, the bone is cleared, the mucous membrane over the jaw is divided in front and behind, well clear of the disease, the necessary teeth are extracted and the jaw is sawn through in front and behind well beyond

FIG. 36.—INCISIONS FOR REMOVAL OF THE TONGUE AND A PORTION OF THE JAW. The continuous line indicates the skin incision, the dotted ones the section of the jaw.

the limits of the disease. The divided portion of the jaw is now left attached to the tongue, while the glands in the submaxillary region, which are generally infected, are dissected out and the lingual artery tied as it passes beneath the hyoglossus muscle. The mouth is then opened with a gag and the next stage of the operation carried out from the mouth. The mucous membrane of the floor of the mouth is divided in front of the disease, the anterior pillar of the fauces is snipped through and the tongue split along the raphe. The flap is then turned up, the mylo-hyoid muscle divided, and a view of the interior is obtained by pushing the detached portion of bone out of the





recourse to in addition to the use of rectal alimentation, or a tube may be passed into the stomach and left there.

Mouth-feeding may be had recourse to from the first in those cases in which the wound in the mouth is small, or the patient is unable or unwilling to be fed *per rectum*, and in these cases it should be done by means of a long soft rubber catheter—No. 14 to 16—attached to a feeder and slipped down the sound side of the pharynx into the œsophagus ; the fluid is poured slowly along it, so as to allow the patient time to swallow. After the food has been administered in this way, the meal may be finished by pouring half an ounce of water down the tube, so as to clear out the last few drops of food, and thus avoid fouling the wound as the tube is withdrawn. The mouth should be thoroughly rinsed out or sprayed with an antiseptic solution immediately after the meal. The patient may be allowed a little ice to suck if he complains of thirst or the mouth feels dry.

At the end of the first twenty-four hours a saline purge should be administered through the tube. All these patients swallow a certain amount of blood either at the time of the operation or afterwards, and this is apt to disorder the digestion ; a purge gets rid of it and the patient is made comfortable. Salol in 10-grain doses three times a day for the first three or four days is also of use.

As soon as the patient recovers from the effect of the anæsthetic he should be propped up in the sitting position, with the head bent well forwards in order to facilitate the escape of discharges from the mouth. It will generally be found that by the second day the patient is able to sit up, and unless the operation has been very extensive, he can usually get up on the fourth or fifth day, and should always be encouraged to do so as soon as he feels inclined. Recovery is usually very rapid when no unfavourable complication arises, so that by the end of a fortnight or three weeks the patient is practically well. He should, however, be kept under close observation for three weeks from the time of the operation, because secondary hæmorrhage may occur at any time up to then ; it is most common from the tenth to the sixteenth day after the operation, and occurs especially when the lingual trunk has been tied in a wound communicating with the mouth.

**The question of recurrence.**—Should recurrence take place in the mouth, the question of the feasibility of further operation will depend upon where it is situated and on its extent. Frequently it is only a small mass at one end of the cicatrix and is then best removed by simply cutting out the affected area with the thermo-cautery. On the other hand, it may occur in the depth of the wound amongst the remains of the muscles of the tongue and may be inoperable. No special rules can be laid down, but the case must be carefully watched, the patient being seen every three or four weeks for several months, so as to detect a recurrence at the earliest possible period. The thermo-cautery is a



region and the anterior triangle must be cleared out. For this purpose the incision through the skin should be free, and no attempt should be made to avoid scarring the neck. The incision should commence about the level of the lobule of the ear and run along the anterior border of the sterno-mastoid muscle to the lower part of the neck. When enlarged glands are present it may be carried down to the sterno-clavicular joint; when there are none it need not go quite so far. Another incision



FIG. 37.—INCISIONS FOR CLEARANCE OF THE GLANDULAR AREA OF THE SIDE OF THE NECK. The diagram shows the long straight incision (4) along the anterior border of the sterno-mastoid, and (1) the second incision—which is really a little curved in practice—running from it to the symphysis. When there is any considerable enlargement of the glands a third incision is made opposite the figure 3 but running backwards across the sterno-mastoid, which is subsequently divided. 2 is the lower border and 3 the angle of the lower jaw.—(Bullin, 'Diseases of the Tongue.')

must be carried forwards from the anterior part of the vertical incision so as to expose the submaxillary region. This begins about the level of the upper border of the thyroid cartilage and runs forwards and somewhat upwards along the hyoid bone, curving upwards to reach the lower jaw (see Fig. 37). From the upper part of this incision and a little below the level of the tip of the mastoid process, another incision should be carried backwards to beyond the posterior border of the sterno-mastoid muscle. This is especially necessary when the glands are enlarged, because it is advisable to divide the sterno-mastoid muscle transversely above the point at which the spinal accessory nerve enters



disease in the mouth, the surgeon may ligature the lingual artery in its continuity if he chooses, as it can easily be exposed in the dissection. If there is any reason to suppose that the glands in the submental region are also infected the incision may be prolonged forwards and this area cleared out also (see below).

The *anterior triangle* is the situation in which the enlarged glands are chiefly found, and the one in which the greatest thoroughness is essential, for it must always be remembered that, if the glands are imperfectly removed and recurrence takes place, it is practically impossible to perform a second operation satisfactorily. The first operation therefore cannot be too thorough.

The glands in the anterior triangle are in intimate relation with the sheath of the jugular vein, and from quite an early period it is difficult to separate the two structures without running the risk of puncturing or tearing the glands. At a later period the vein is usually so mixed up with the mass of glands that it is excessively difficult to remove the latter without injuring the vein. The main enlargement occurs near the bifurcation of the carotid artery, but the glands run upwards to the parotid gland, and when the disease is situated at the back of the tongue special care is necessary to remove the glands and lymphatic vessels which cross in front of, and behind, the digastric muscle. In this region also the glands extend outwards under the sterno-mastoid, and are usually divided into two main groups by the spinal accessory nerve. The upper and posterior mass bulges beneath the muscle and is intimately connected with the deep fascia over the deeper muscles in the neck where it extends on to the atlas, and this fascia must be divided above in order to allow of thorough removal.

We have already laid considerable stress (see p. 75) upon the great importance of taking care not to rupture the glands in removing them, lest epitheliomatous infiltration of the wound should occur, and therefore all incisions should be very free, and the entire glandular area should be thoroughly exposed before the removal of the glands is proceeded with. There should be no attempt to pull enlarged glands out of deep recesses when an increase in the length of the incision or a further dissection will enable them to be removed without risk, and no attempt should be made to shell out each individual gland; the whole of the tissues in which the glands are lying must be removed *en masse*. Attempts to shell out soft glands will generally lead to their rupture; should such an accident happen, the best procedure is probably to wash out the wound with a 1 in 2000 sublimate solution and then to open up the whole surface and rub it over with undiluted carbolic acid. We have had accidents of this kind, and in one or two cases no infection followed after using this method; but in others it has failed us, probably because the carbolic acid did not reach some portion of the raw surface.

Certain guides are necessary to perform the operation systematically.









present in it. If enlarged glands are present, they should be removed and a slice of the parotid gland taken with them. All the fat, fascia and glands below the spinal accessory are next removed right back into the posterior triangle. The glands are usually not markedly enlarged in this situation and are readily peeled down with a blunt dissector or the finger ; only an occasional touch of the knife or the scissors is required.

When the glandular area has been removed, all the structures in the anterior triangle of the neck should be visible, and the carotid artery and the vagus nerve should be pulled aside to see whether there are enlarged glands behind them. The various structures in the submaxillary region are also seen. The under-surface of the sterno-mastoid should be stripped bare of its fascia, and the deeper muscles of the neck should also be seen devoid of their fascial covering. The divided sterno-mastoid is then united with catgut in the ordinary manner (see Vol. II. p. 62).

**Clearance of the submental and submaxillary regions.**—As a rule it is not necessary to interfere with the submental area unless enlarged glands are present in the submaxillary triangle or unless the growth is situated near the tip of the tongue or on or below the frenum. When this is the case, however, the submental or both submaxillary regions should be cleared. If there is any reason to fear infection of the anterior triangle, the incision should be carried out to the sterno-mastoid muscle and another incision made parallel to the anterior edge of that muscle, as already described.

These areas are most conveniently cleared by an incision parallel to and a little below the lower border of the jaw, running from angle to angle and curving downwards at its extremities. The flap is turned downwards and exposes the whole area. The submaxillary regions are cleared in the manner described above. The glands in the submental region are partly superficial to, and partly beneath and between, the genio-hyoid muscles. After the superficial fat and fascia have been removed the latter muscles should be separated and the fat and glands beneath them taken away.

*After-treatment.*—When the wound does not communicate with the mouth no drainage tube is required. The incision is closed by a continuous suture and the ordinary antiseptic dressings are applied, a large mass of wool being put on at the time of the operation so as to act as a splint and keep the parts at rest. When the wound communicates with the mouth, drainage must be employed, and the tubes should be brought out at the most dependent part, one at any rate being made to emerge in the posterior triangle through a button-hole in the skin.

#### THE TREATMENT OF INOPERABLE CASES.

A patient dying of inoperable cancer of the tongue is in such a pitiable condition that if possible something must be done to relieve him. The



sound side, and the opposite angle is pulled back with a retractor. The tip of the tongue is seized with forceps and pulled forcibly over to the sound side, when the nerve should start into prominence beneath the mucous membrane just behind and below the last lower molar tooth. If a vertical incision is made through the mucous membrane in this situation, the nerve can be identified, cleared, and a portion excised. At the same time it is obvious that if the growth extends into this region the operation will be difficult or impossible.

*The fætor of the breath* should be treated by the frequent use of various antiseptic mouth-washes (sanitas, peroxide of hydrogen, or boro-glyceride), and by powdering the surface of the sore frequently with iodol and touching it occasionally with pure carbolic acid after drying it carefully.

The excessive *salivation*, which is a source of intense discomfort, may be diminished by the administration of atropine.

The *hæmorrhage* often reduces the patient considerably, and it has been proposed to tie the external carotid to prevent this; secondary hæmorrhage is, however, very apt to occur. Styptics are of little use, as they generally cause severe pain and do not check the bleeding materially. In some cases the hæmorrhage may be so severe as to kill the patient almost immediately.

Ligature of both lingual arteries as they come off from the external carotid is sometimes worth doing at an earlier period, as it not only diminishes the risk of bleeding, but exerts a distinct restraining influence upon the growth; in some cases sloughing of a considerable portion of the growth may take place and a cleaner and less painful sore be left behind in the mouth.

Still better than simple ligature of the lingual artery is the injection of boiling water into the branches of the external carotid artery, especially the facial and lingual. When the vessels are simply tied, the blood reaches their terminations by the collateral circulation and the effect produced is only slight. If, however, boiling water is injected, the walls of the smaller vessels are so injured that the blood clots in them and the circulation is completely arrested in that area. The result is partial sloughing of portions of the diseased tissue and atrophy of other parts, and we have seen most remarkable improvement follow this treatment; in some cases, indeed, it has been possible subsequently to remove the remainder of the disease in the tongue. The vessels on both sides should be treated, but a week should elapse between the two operations. The external carotid artery is exposed and its branches defined (see Vol. II. p. 204). A syringe is filled with boiling water, the needle is pushed through the wall of the various branches in turn and the water injected. Before dealing with a fresh branch, the syringe is refilled, as it is essential that the water should be as hot as possible. After the needle is withdrawn the vessels are ligatured on both sides of the puncture. As a rule the

superior thyroid artery is injected as well as the lingual and facial, but this does not seem to be absolutely necessary.

Various other substances such as methyl violet and Coley's fluid have been used, but we cannot recommend them. Nor does radium seem to be of any value; indeed in the cases in which we have seen it used, the disease has seemed to progress more rapidly than before.

## CHAPTER X.

### AFFECTIONS OF THE FLOOR OF THE MOUTH

#### RANULA.

A RANULA is a cyst in the floor of the mouth or on the under-surface of the tongue due to dilatation of one of the muciparous glands from blocking of its duct. The blocking of the duct may be due to inflammation about the orifice, or to obstruction by inspissated mucus.

The cyst forms a rounded prominent swelling on one side of the middle line which varies in size from a pea to a plover's egg, and has a characteristic bluish tint, which has been aptly compared to a purple grape. It contains a considerable quantity of mucin and may occasionally be large enough to interfere with the movements of the tongue.

**TREATMENT.**—*When the tumour is small*, the surface may be painted with a 10 per cent. solution of cocaine, to which are added a few drops of adrenalin chloride, and a little of this solution may also be injected beneath the mucous membrane over the cyst; the mucous membrane over the anterior wall of the cyst is then caught up with toothed forceps, divided, and the cyst removed entire.

*When the cyst is large*, its complete removal leaves a cavity in the floor of the mouth in which saliva and food collect and undergo putrefaction. The best plan in these cases is to apply cocaine as above, pull up the tongue with tongue-forceps, seize the anterior wall of the cyst in catch-forceps and clip away as much of it as possible, so as to expose the deeper part of the cyst freely. This portion is then sponged over with undiluted carbolic acid or with pure nitric acid on a glass brush; in the latter case the acid is subsequently neutralised by filling the mouth with a solution of carbonate of soda. A strip of iodoform gauze is packed into the cavity and renewed daily until the whole wall is granulating, when further packing is unnecessary. This method generally effects a cure, and it is only when recurrence takes place after it that it is necessary to subject



difficult, especially when there is much inflammatory thickening of the tissues around. As the duct passes backwards to the submaxillary gland it lies deeper and deeper in the floor of the mouth, and it comes into close relation with the lingual gustatory nerve which lies on the outer side about the level of the anterior border of the hyoglossus muscle, so that if the incision deviates from the direct line of the duct, the nerve is very apt to be divided, and in several cases this has occurred and led to a troublesome and persistent anæsthesia of one half of the tongue. It is best to operate under a general anæsthetic, as it is almost impossible to control the movements of the tongue if a local anæsthetic is employed. The mouth is opened with a gag, the head is propped up in a good light, or a powerful forehead light is employed, and the tongue is pulled over to the opposite side so as to make the structures in the floor of the mouth as tense and steady as possible. The calculus is then felt for, and is steadied by the forefinger of the left hand pressing it outwards against the ramus of the jaw, whilst the surgeon cuts directly down upon it in the line of the duct. The fixation by the finger should not be relaxed until the stone has actually been exposed, otherwise the parts recede deeply into the floor of the mouth and a second incision may go in a different direction and do damage. When the stone is situated very far back, it is a useful plan to thrust a sharp hook through the mucous membrane of the floor of the mouth beneath the swelling and hook it forcibly upwards and so fix it while it is cut down upon. When the stone has been reached, the duct is slit up sufficiently to enable it to be withdrawn without using any force. The calculus must be examined after removal to see if any portions have been broken off and left behind, and if so they must be searched for and removed, otherwise they may become the nuclei of fresh calculi. The wound in the mouth needs no treatment beyond the use of a mouth-wash of chlorate of potash for a few days. There is generally some interference with the movements of the tongue at first, as a result of the swelling following the operation, but this subsides quickly.

*When the calculus is situated in the gland itself*, an attempt to remove it from the mouth will not only jeopardise the lingual nerve, but may give rise to dangerous cellulitis, as it necessitates a deep dissection in the floor of the mouth. Moreover, stricture of the duct is apt to occur subsequently from cicatricial contraction. Under these circumstances, it will be best to excise the gland and its duct completely by an external operation, as a simple incision for extraction of the stone would probably be followed by a salivary fistula. The operation is described on p. 103.

### DERMOID CYSTS.

Dermoids are not uncommon beneath the tongue and generally occur in the middle line either in the anterior third of the tongue itself or more deeply seated in the floor of the mouth, when they bulge between the jaw





tonsillar region through which the organisms gain entrance. It is most common in adults, but may also occur in young children, and is a particularly grave and fatal disease.

In a few hours after the commencement of the disease the floor of the mouth becomes hard and brawny, so that the tongue is raised and thrust upwards against the roof of the mouth, whilst the skin in the submental or submaxillary regions becomes indurated and dusky red in colour; the swelling soon spreads to the side of the neck and may extend down to the clavicle. Articulation and mastication are both interfered with, and there may be considerable dyspnœa, partly owing to the swelling of the tissues in the neck, but mainly to the spread of the inflammation backwards giving rise to œdema of the glottis. The temperature is often high at first, but falls later on, and the patient shows symptoms of profound septic poisoning. In the majority of cases a fatal result occurs, often in about three days from the commencement of the inflammation.

**TREATMENT.**—The only chance in this disease is to adopt early and energetic treatment. In the earliest stages, before the disease is fully established in the cellular tissues of the neck, *antiseptic mouth-washes*, such as sanitas or 1 in 4000 corrosive sublimate, may be of service, and should be employed as frequently and as hot as possible. *Large boric fomentations* (see Vol. I. p. 51) should be applied to the submental and submaxillary regions, and it is well to commence at once by injecting a large dose of *anti-streptococcus serum*. Thirty c.c. of the polyvalent serum should be injected as soon as possible, followed by 10 to 15 c.c. two or three times a day. The mistake generally made is to inject too small rather than too large a quantity. Vaccines do not seem to be of much value. These cases are always due to streptococcal infection and are typical in their symptoms, so that there is no need to wait while a bacterial cultivation is made.

Directly brawniness in the neck is evident, *free incisions* should be made everywhere through the affected part, so as to facilitate the escape of sloughs and pus. Nothing but the freest possible opening up of the affected area is of any use. The incisions should go through the deep fascia in several places and the tissues should be widely opened by the finger and forceps so as to allow of the best possible drainage. The incisions should be planned so as to avoid the important structures in the neck, and where the deeper structures are opened up, Hilton's method (see Vol. I. p. 28) should be used. The wound should be freely sponged over with undiluted carbolic acid, powdered with iodoform and packed with strips of iodoformed gauze. Some advantage seems to be gained by the free administration of citric acid or citrate of potash, the view being that it increases the exudation of serum containing anti-bodies from the wound.

When the disease commences far back in the mouth, it is generally unilateral. It often spreads from one side to the other, however, and

a careful watch must, therefore, be kept on both sides, and the tissues must be opened up on the slightest sign of brawniness. When the tongue itself and the floor of the mouth are brawny, free incisions must be made in that situation also (see p. 56). In doing so care should be taken to avoid the lingual nerve and Wharton's duct (see p. 114). The incisions here should only go through the mucous membrane; the forceps are then used to open up the deeper tissues. On account of the difficulty of drainage, incisions in the mouth should not be made unless definitely called for. The general treatment of diffuse cellulitis (see Vol. I. p. 37) must accompany these procedures; quinine in large doses (gr. xv. three or four times a day) is valuable.

In spite of the free incisions it is not uncommon to find that the obstruction to respiration is so great as to call for intubation or tracheotomy. Whenever it is possible, *intubation* (see Vol. V.) should be preferred, as a tracheotomy wound almost unavoidably becomes infected, especially when the neck has been laid open freely, and septic pneumonia of a most grave type is liable to set in. At the same time, however, intubation is not always feasible as the swelling may not be limited to the glottis, but may occur actually in the larynx. Under these circumstances, we prefer to use a Hahn's or Trendelenburg's tube for the first twenty-four or forty-eight hours, so as to minimise the risk of the introduction of septic material into the air-passages beside the tube.





is composed of the mucous and submucous coats only, which have been protruded through the lower and posterior part of the inferior constrictor of the pharynx, where a weak area is present owing to deficiency of the longitudinal muscular fibres of the upper end of the œsophagus. Other factors which predispose to the formation of diverticula in this situation are the normal, sphincter-like action of the upper end of the œsophagus and in some cases actual narrowing from disease. The exciting causes are injury and the constant pressure of the food in the act of swallowing, the latter leading to the outward propulsion of the mucous pouch.

The condition leads to dysphagia from the entrance of food into the sac, which then presses on and obstructs the œsophagus. The food in the sac also decomposes and causes foetor of the breath. The result is starvation, or septic pneumonia as the result of the accumulation of putrid material. In some cases ulceration has occurred followed by perforation of the sac with consequent fatal cellulitis.

*Diagnosis.*—On passing a bougie it is not uncommon to find that at one time a large bougie passes easily into the stomach, while at other times it stops about eight inches from the teeth, the explanation being that in the latter case it enters the pouch. The existence of a pouch can be demonstrated by administering bismuth oxychloride, well mixed with bread and milk. Some of this material will enter the sac, especially if the latter has been previously emptied by external pressure and efforts at swallowing and abstention from food for a day or two. As a result the presence, size, and situation of the sac can be seen on the X-ray screen or in a radiogram. By means of the œsophagoscope the orifice of the opening can also be demonstrated and a bougie can be introduced into the sac. The latter method of investigation, which is somewhat trying to the patient, is not however always necessary.

**TREATMENT.**—The only method of treatment is by operation, and two procedures have been adopted, viz., excision or invagination of the sac. The great risk of excision is the occurrence of septic cellulitis from infection of the wound in the neck, either during the operation or as the result of subsequent leakage from the pharynx; this cellulitis may spread downwards into the posterior mediastinum, and generally proves fatal. In most cases, however, this risk can be avoided if the operation is carefully performed. It was with the view of minimising this risk that invagination instead of excision of the sac was suggested, but this is not a good plan, and, if employed at all, should be restricted to very small diverticula. If a large diverticulum is invaginated, it forms a polypus in the œsophagus, which may obstruct the canal and cause dysphagia, and may cause coughing and much discomfort. Protrusion of the sac and reproduction of the original trouble has also occurred after this operation.

Before proceeding to excision of the sac, the teeth and mouth should



or water escaping through the drainage tube—the patient should be instructed to gargle frequently with boric lotion and to swallow small quantities of it, with the object of keeping the pharyngeal wall as clean as possible and of allowing a certain amount of boric lotion to find its way down through the drainage tube and thus wash it out. If the temperature rises and remains elevated, the wound in the neck should be opened up freely and packed with cyanide gauze ; in addition the drainage tube should be retained.

### INJURIES OF THE PHARYNX AND TONSILS.

These are not common, but foreign bodies, such as a pipe-stem, may be driven deeply into the substance of the tonsil or pharynx and cause a *lacerated wound*, or may pass through the wall of the pharynx and injure the vessels outside. The hæmorrhage in these cases may be severe, and usually comes from the tonsillar circle of vessels, composed of the anastomosing branches of the following vessels—the dorsalis linguæ branch of the lingual artery, the ascending palatine and tonsillar branches of the facial, the ascending pharyngeal branch of the external carotid, and the descending palatine branch of the internal maxillary.

**TREATMENT.**—The patient should be placed in a good light and the mouth opened with a suitable gag. If good daylight is not available, a forehead mirror and an artificial light should be employed. The blood is mopped up with small sponges upon sponge-holders or forceps, and any spurting vessel seized with forceps and tied. If the hæmorrhage merely consists in oozing from small vessels, the best plan is to push a small plug of wool dipped in a solution of adrenalin chloride (1 in 1000) into the wound and hold it there for a short time, when the bleeding will usually cease. In the more serious cases of oozing it may be necessary to hold a sponge firmly pressed against the wound, whilst counter-pressure is made by the finger just behind the angle of the jaw externally. The sponge should be impregnated with a solution of adrenalin chloride or, failing that, tannin or matico, and it may be necessary to keep up the pressure for some hours. A convenient method by which the pressure may be maintained is to pass a suture from one pillar of the fauces to the other by means of a long-handled needle. A piece of sponge to which a string has been securely fixed, so that the sponge cannot be lost, is then placed on the bleeding spot and held in position by tying the ligature. It may be left *in situ* for twenty-four hours, the string hanging out of the mouth ; the stitches are then cut and the sponge removed.

When severe hæmorrhage comes from a deep wound of the tonsil it may be necessary to control the main vessels temporarily before the bleeding can be arrested. If this should be called for, the bifurcation of





of a knife) should be introduced between the teeth, the finger thrust rapidly to the back of the pharynx, the foreign body felt for, the finger hooked round it and the object removed. This will generally be successful when the obstruction is caused by a smooth substance such as a mass of food. When, however, the body is angular and becomes impacted, as will be the case with a tooth-plate, this method will not suffice and an attempt should be made to remove the body with suitable pharyngeal forceps (see Fig. 40) if they should happen to be at hand, but

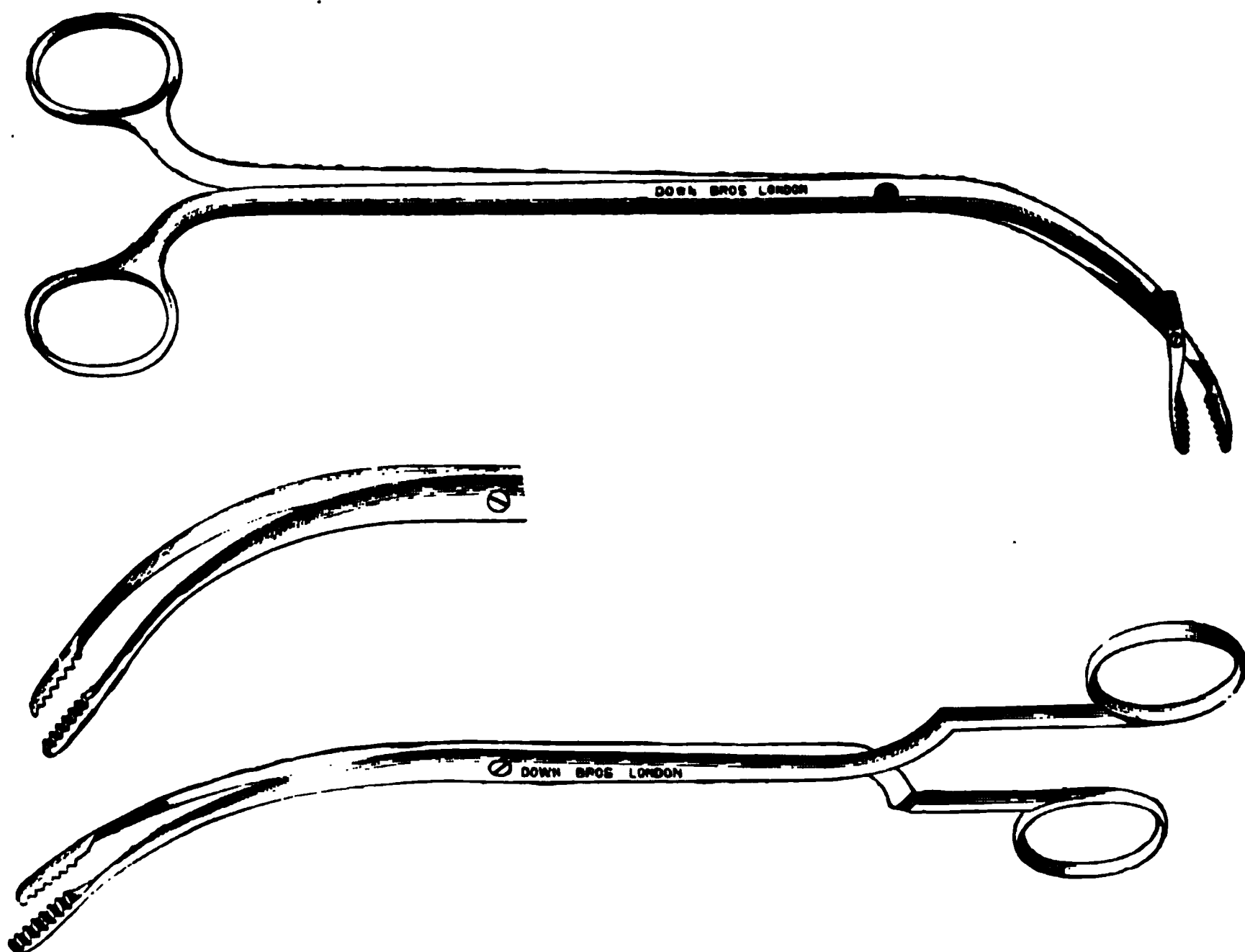


FIG. 40.—FORCEPS FOR REMOVAL OF FOREIGN BODIES IN THE PHARYNX. The blades of the lower pair are flexible and can be bent to any desired curve.

in many cases the asphyxial symptoms will be so severe that laryngotomy (or tracheotomy in a young child) must be performed immediately, and the removal of the foreign body postponed until normal respiration has become established. As soon as possible, a further attempt should be made to dislodge the foreign body; in a young child inversion and vigorous shaking may be effectual in doing so.

In order to remove foreign bodies from the pharynx, forceps with all sorts of curves must be at hand (see Fig. 40), the most useful being those with blades opening in the antero-posterior direction. All attempts should be made under cocaine (10 per cent. solution) with a brilliant illumination. It may be necessary to break up the foreign body



## FOLLICULAR TONSILLITIS.

This is an affection of the crypts or follicles of the tonsil and is of bacterial origin. It is commonly ascribed to bad hygienic conditions, such as defective drains, dirty bedding, or direct infection by the discharges from the mouths of those suffering from a similar affection. It is particularly liable to occur in those who are the subject of chronically enlarged tonsils.

*Symptoms.*—The disease is characterised by acute symptoms such as headache and pyrexia, and is marked by the presence of small whitish grey spots upon the tonsils, generally on both sides; these are at first multiple, but may coalesce in patches and form a pseudo-membrane which somewhat resembles that of diphtheria, but differs from it in being easily detached with a camel's hair brush. The diphtheritic membrane is very adherent and usually occurs in a single large patch, which tends to spread beyond the limits of the tonsils, whereas the patches in follicular tonsillitis are small and scattered over the tonsil. There is usually much painful swelling of the glands behind the angle of the jaw, even though the local disturbance is slight.

*Prognosis.*—As a rule the attack passes off quickly. Although the temperature may be high and the swelling of the glands very marked and very painful at first, the acute symptoms usually subside in four or five days and the glands rarely suppurate. The trouble is, however, extremely liable to recur, especially if the patient is exposed to fresh sources of infection, or if there is chronic enlargement of the tonsils. In view of the latter fact, the enlarged tonsils should be removed after the attack has subsided (see p. 131). Moreover, the enlargement of the glands in the neck should be carefully attended to, as they are liable to become the seat of tuberculous disease unless the inflammation in them disappears under suitable treatment.

**TREATMENT.**—It is important to try to ascertain the cause of the mischief and to *remove the patient from any insanitary surroundings*. Thus if the drains are defective, the patient should be removed to another house while the defects are being remedied. The possibility of infection from dirty rooms, dirty mattresses or pillows, should also be remembered, and all bedding should be thoroughly cleaned and disinfected. At the same time it is of extreme importance to point out to the patient the distinctly infectious nature of the disease, so that at any rate a certain amount of *isolation* may be practised. The other members of the household, especially children, should be kept away from the patient as much as possible, and infection by kissing, or by using the same eating or drinking vessels, should be guarded against.

In the treatment of the disease itself a *purge* such as calomel (gr. ij. to v.), or mist. alb. (℥iss.), should be given when the patient is first



After the patches of exudation separate, small ulcers are left upon the tonsil which usually heal readily. If there is any delay, they may be brushed over with a solution of nitrate of silver (gr. xx. to the ounce) every morning. After an attack of follicular tonsillitis the patient is generally considerably pulled down in health, especially if the attack has been a severe one, and hence during convalescence it will be necessary to order light nourishing food, and to provide if possible a change of air. As soon as he has recovered, the tonsils should be removed if still enlarged (see p. 131).

#### SUPPURATIVE TONSILLITIS.

This condition—popularly known as ‘quinsy’—is an acute inflammation of the tonsil with suppuration around it. The pus forms above and in front of the tonsil, and spreads towards the soft palate, though occasionally it forms behind or external to the tonsil. As a rule there is an acute tonsillitis on both sides, whilst the suppuration occurs on one side only, or, if bilateral, it appears on one side before the other. The temperature is very high, the swelling may almost block the aperture of the fauces, and the glands behind the jaw are large, painful, and may suppurate. There is considerable swelling of the neighbouring portion of the pharynx and soft palate, and generally also œdema of the glottis. The symptoms, on the whole, are very similar to those of other forms of inflammation of the tonsils, only much more severe. The pain, especially on any attempt to swallow, is very intense.

**TREATMENT.**—Abortive treatment usually fails to prevent suppuration, but may relieve the patient considerably. It is well to begin with a *saline purge* (mist. alb. ℥iss.). Some surgeons used to place great faith in the administration of *tincture of aconite* given in minim doses, repeated every hour for four or five doses until the pulse rate approached the normal. It is well to administer ten-grain doses of *salicylate of soda* every four hours. *Large hot fomentations* changed every two or three hours should be applied to the neck to relieve the pain, while *steam inhalations* are employed for the relief of the pain on swallowing. Gargles, as a rule, are out of the question on account of the severe pain, but a spray of a saturated solution of *bicarbonate of soda* in a Siegel’s apparatus is valuable if there is an unduly free secretion of tenacious mucus which interferes with the patient’s comfort. When this secretion is not excessive, *the carbolic acid and iodine spray (vide supra)* is useful, as, apart from its antiseptic action, the carbolic acid is a useful sedative.

Suppuration is usually evident about the third day, and watch should be kept for its occurrence. The pus generally points in the soft palate just above the tonsil, and it may escape through the supra-tonsillar fossa. These tonsillar abscesses should always be opened.

*When the suppuration is situated above the tonsil*, the surgeon will be guided as to the right time to open the abscess by the amount of swelling



For the first day or two it is well to use an antiseptic spray, of which the carbolic and iodine solution (see p. 127) is perhaps the best. As soon as

the swelling has subsided a little, the patient will be able to gargle with sanitas or chlorate of potash. The same treatment with regard to the administration of tonics, food, and fresh air, is applicable to this condition as to follicular tonsillitis (see p. 128).

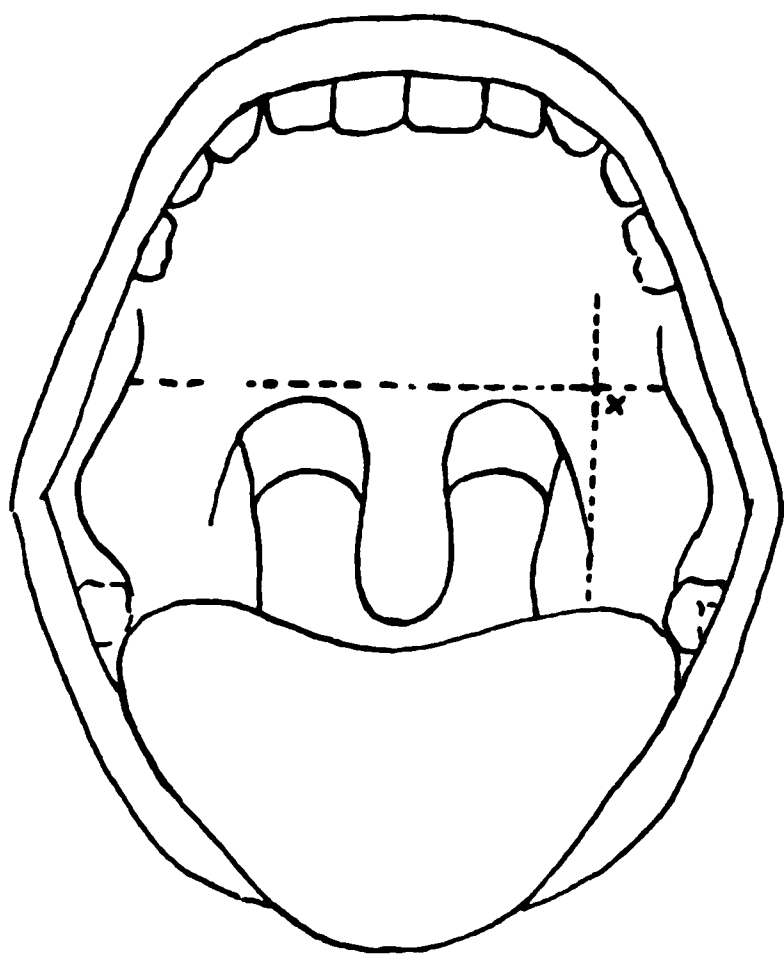


FIG. 43.—DIAGRAM TO ILLUSTRATE THE POINT AT WHICH TO OPEN A PERI-TONSILLAR ABSCESS. The point X is the junction of a line drawn horizontally across the base of the uvula with one prolonging upwards the anterior pillar of the fauces. (From *Diseases of the Nose and Throat*, by Sir St. Clair Thomson.)

#### ACUTE ULCERATIVE TONSILLITIS.

This is an inflammatory condition of the tonsil and fauces, frequently accompanied by ulceration, on the surface of which there may be a slough. It is common amongst those who work in hospitals, and in that case goes by the name of 'hospital sore throat.' A bacteriological examination should always be made;

the usual organism present in these cases is a streptococcus.

**TREATMENT.**—This should be on the lines laid down for follicular tonsillitis (see p. 126); special importance attaches to the application of astringents and antiseptics to the lesion in the throat. Equal parts of liquor ferri perchloridi and glycerine may be painted on three or four times a day, whilst a solution of nitrate of silver (gr. xx. to xl. to the ounce) may be brushed over the ulcer every morning with advantage. The employment of a vaccine of the organism present may be of benefit. The disease is of an infective nature and may be followed by Ludwig's angina if neglected. It is of primary importance in the treatment to remove the patient from the surroundings in which he has contracted the affection, otherwise remedial measures may be used in vain. Good hygienic conditions, nourishing food and the administration of port wine, are important; a short holiday in the country is of the greatest advantage.

#### VINCENT'S ANGINA.

This is the most serious form of acute tonsillitis and occurs especially in children. It is described by Vincent under two types, an ulceromembranous and a diphtheroid variety. The organisms supposed to be the causal agents are a fusiform bacillus and a spirillum. It is the disease sometimes described as pseudo-diphtheria. In both forms the patient





is employed, only the projecting part of the tonsil is shaved off, but as a rule most of the open crypts are taken away. It is not uncommon, however, for recurrence of the enlargement to take place, and a second or third operation may be necessary. When, on the other hand, complete enucleation is practised, recurrence does not of course take place, but the operation is more serious and prolonged, and it has only been extensively practised quite recently, so that its possible effect, more especially on the singing voice, can hardly be gauged as yet. When adenoids are removed at the same time it is usual to begin by taking away the adenoids and then to deal with the tonsils; the trouble with bleeding is generally less when this sequence is followed.

*Removal by the Guillotine.*—The best guillotine for this purpose is Mackenzie's (see Fig. 44). The ring into which the tonsil is received is variously shaped, being sometimes circular for tonsils that are not unduly elongated in any particular direction, and sometimes oval, with its long

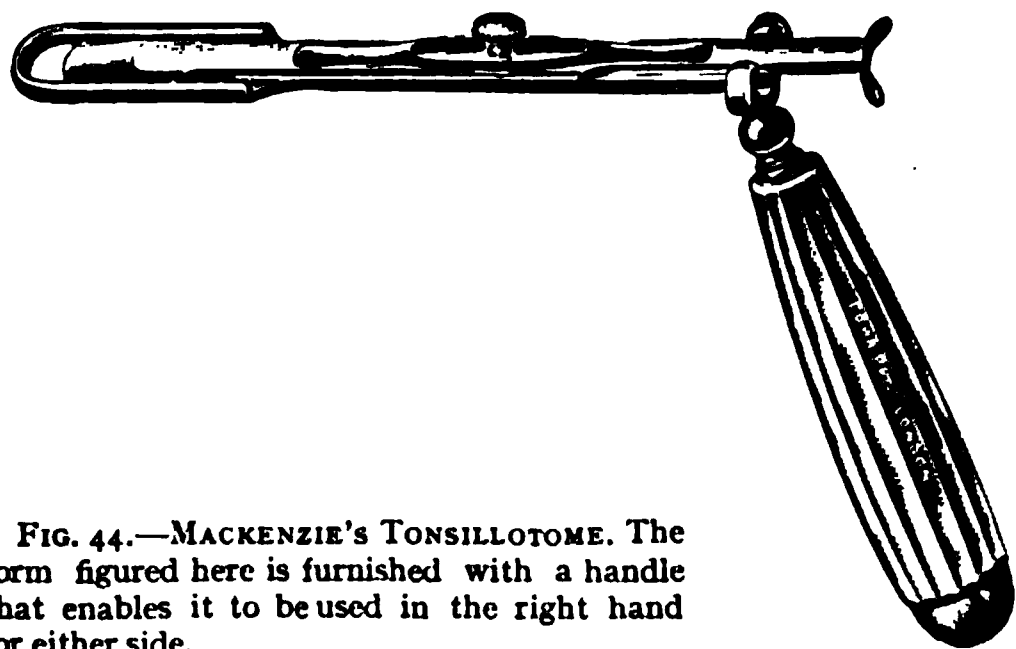


FIG. 44.—MACKENZIE'S TONSILLOTOME. The form figured here is furnished with a handle that enables it to be used in the right hand for either side.

axis either horizontal or vertical for tonsils that are especially enlarged in either of these directions. Unless the patient is a young child, no assistance is required, but in the young it is necessary to have some one to keep the mouth open with a gag and also to make counter-pressure over the tonsil and to hold the head.

This can be done by the anæsthetist when an anæsthetic is employed. The tonsillotome is introduced with its flat surface parallel to the dorsum of the tongue until it reaches the back of the pharynx, when it is turned so that the tonsil is received into the ring of the instrument. If the operation is done without an anæsthetic, care should be taken to avoid touching the tongue, as the instrument is passed in, and the parts should be anæsthetised by painting with a 10 per cent. solution of cocaine. As the tonsil is received into the ring of the instrument, the assistant presses firmly inwards beneath the angle of the jaw so as to steady the tonsil and push it well into the loop. The surgeon then manipulates the instrument so as to press its end firmly outwards against the pharyngeal wall, the handle being carried towards the opposite side of the mouth, and he then pushes the cutting blade home sharply with the thumb. This movement, although momentary, requires care to avoid tilting or rotating the instrument as the blade is pushed home. Unless the tonsillotome is held absolutely steady, its end is apt to be deflected inwards and a portion of the tonsil will escape. Especial care







downwards and inwards. The mucous membrane at the sides of the tonsil generally tears through, but at the lowermost part it may be necessary to divide it with scissors (see Figs. 46–48). In some cases the operation is easy: in others it is very difficult. The tonsil may be very friable and break into small pieces. The degree of anæsthesia required is greater than that for the ordinary guillotine method, and on this ground alone the operation has been very adversely criticised, especially for children. It is, however, gaining in favour.

*After-treatment.*—The patient should be kept indoors for a day or two and confined to his room so as to avoid cold. Before performing an operation such as tonsillotomy, the hygienic conditions of the house should be inquired into, for if the operation is done in a house in which the drains are defective, serious septic sore-throat is apt to follow. As a local application some mild antiseptic gargle, such as chlorate of potash and boric lotion, is all that is required. Soft food should be given for the first four or five days.

### POST-NASAL ADENOID GROWTHS.

We are indebted to Dr. H. Lambert Lack, Surgeon to the Throat Department of the London Hospital, for the following paragraphs.

Adenoids are most common in children, but are met with up to thirty, or even later, and they tend to atrophy during adolescence. They may be hereditary; distinct evidence of former adenoids such as deafness, malformation of the jaws, and open mouth are often seen in the parents of adenoid children. They are more common in cold, damp climates and amongst certain races, such as the Hebrews. The most common exciting causes are nasal catarrhs, the exanthemata, diphtheria, sore throats and whooping cough.

*Pathology.*—The growth is a hypertrophy of the normal lymphoid tissue of this region and forms a mass in the vault of the naso-pharynx; from this mass two bands usually extend downwards and to each side and become lost behind the posterior pillars of the fauces. Isolated nodules of lymphoid tissue are also seen lower down in the pharynx and occasionally extend on to the upper part of the nasal septum. Not uncommonly masses are found filling Rosenmüller's fossæ (the deep depressions in the lateral wall of the pharynx behind the Eustachian tubes), and these masses may be adherent to the lips of the tubes.

*Symptoms.*—The presence of adenoid growths may be productive of various troubles. There is a great susceptibility to repeated attacks of 'cold in the head,' catarrh, and obstruction of the Eustachian tubes, and, in the more severe cases, to recurrent attacks of suppurative otitis. The obstructed nose renders mouth-breathing necessary, and children who have adenoids may be generally recognised by the open mouth and the stupid expression, which may be actually associated with ineptitude for



*The anæsthetic.*—In adults, especially if the growths be limited to a large central pad, nitrous oxide anæsthesia is sufficient. When, however, there are other hypertrophies, such as enlargement of the posterior ends of the inferior turbinates, a more prolonged anæsthesia is necessary, and for this purpose gas followed by ether or a mixture of chloroform and ether is probably the best. A prolonged anæsthesia is always advisable when operation is undertaken for the relief of marked deafness. In the majority of cases in *children* it is best to give one of the anæsthetic mixtures, such as the A.C.E. or the C.E. mixture, and the anæsthesia may be completed by giving pure ether by the open method. The anæsthetic may be carefully pushed until the palate is sufficiently relaxed to enable the operation to be easily carried out, but at the same time the cough reflexes should not be abolished and the patient should be able to swallow the blood as it accumulates in the pharynx. This method allows three or four minutes' good anæsthesia, which is usually sufficient, but if necessary it may be

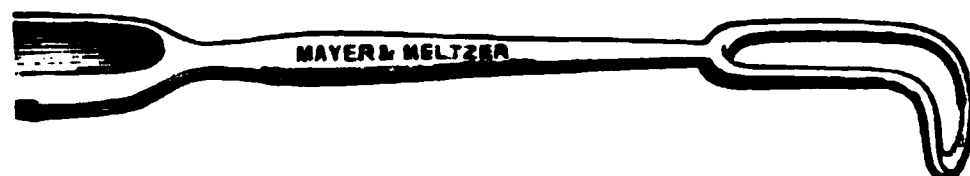


FIG. 49.—MODIFIED GOTTSTEIN'S POST-NASAL CURETTE.

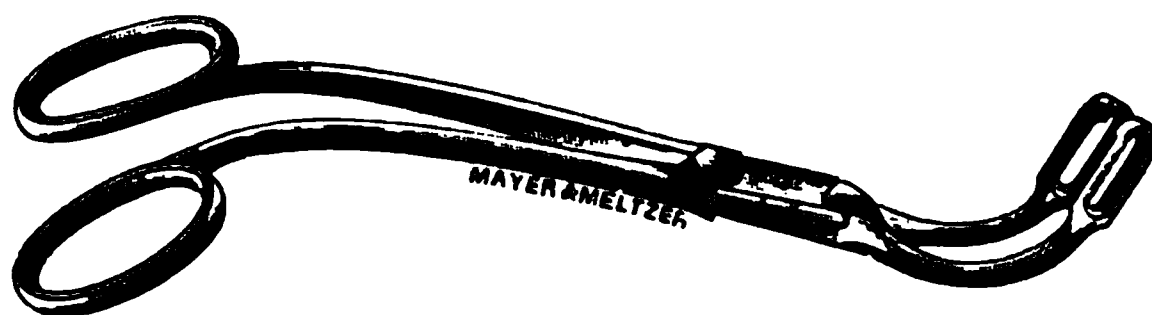


FIG. 50.—JURACZ'S POST-NASAL FORCEPS.

prolonged by giving chloroform through a Jünker. In giving the anæsthetic, the existence of nasal obstruction must be remembered and therefore free mouth-breathing must be allowed, and a gag inserted if necessary.

*The instruments.*—For the removal of the growths a post-nasal curette—such as some modification of Gottstein's—a ring knife and adenoid forceps are required. The points to be attended to in choosing the curette are that its top cutting edge should be fairly strong and not too thick, and that it should be attached by two bars which are parallel and which do not meet at an angle as in many of the instruments (see Fig. 49). It may be provided with a hook or cage to catch the growth, and it is well to have curettes of different sizes. The best forceps is some modification of Löwenberg's, such as Juracz's (see Fig. 50).

**The operation under gas.**—In this method the patient is usually anæsthetised sitting upright in a dental chair, but the supine position may be used if preferred. The patient should face a strong light or, better





into the post-nasal space and passed up on each side into Rosenmüller's fossæ so as to separate the growth from the lips of the Eustachian tubes and the sides of the naso-pharynx. The curette is then introduced and the growths removed as above described.

Should the growths in Rosenmüller's fossæ be very tough, or difficult to get at, their removal can often be effected with a Meyer's ring-knife introduced through the mouth. This may be used as an ordinary curette; the cutting-blade being sharp, it is a very effective instrument. In some cases small pieces of growth at the upper part or sides of the space, or partially detached pieces of growth, may be most easily seized and removed by adenoid forceps guided by the finger.

After the adenoids have been removed, the posterior ends of the inferior turbinates should be examined with the finger and, if enlarged, a piece should be removed with the snare or with cutting-forceps such as

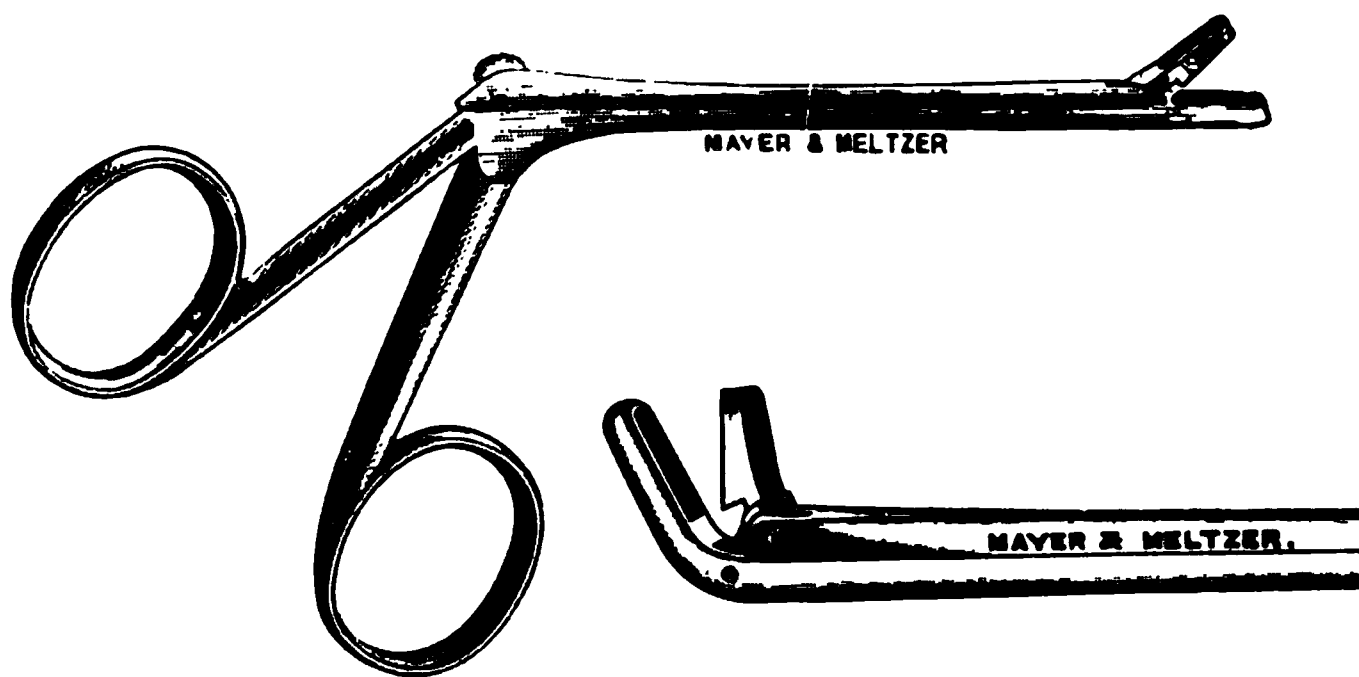


FIG. 51.—GRÜNWARD'S NASAL CUTTING FORCEPS.

Grünwald's (see Fig. 51). The instrument is guided by the tip of the left index-finger. Next, the tonsils, if enlarged—as they so commonly are in association with adenoids—should be removed with the guillotine. Some surgeons prefer to remove the tonsils at the commencement of the operation, but this is not to be recommended. The removal of the adenoids is more easily accomplished during the earlier and deeper stage of the anæsthesia, and the bleeding after tonsillotomy is more sudden and profuse, and therefore it is better delayed until the patient shows signs of coming out of the anæsthetic.

The hæmorrhage that occurs during the operation is usually somewhat free, but it soon ceases. As a rule the patient swallows the blood, but, should it accumulate in the back of the pharynx during the operation, the throat may be sponged out or, better still, the patient should be rolled over on to his side and the mouth wiped out. Should blood enter the larynx or trachea, the patient must be immediately rolled over on to his face and the head lowered; if this be done in time, and the anæsthesia



## CALCULI OF THE TONSILS.

Collection of mucus and calcareous material may occur in the tonsillar crypts and occasionally give rise to calculi, containing chiefly phosphate and carbonate of lime. Leptothrix masses are often present, and occur in the crypts of the tonsils, especially in the supra-tonsillar fossa. They often cause very few symptoms and are recognised as whitish projections from the surface of the tonsils. They may, however, lead to attacks of inflammation or severe stabbing pain.

**TREATMENT.**—The tonsillar crypt can generally be easily cleared out with a sharp spoon of convenient size. Should there be any difficulty in doing this, should the collections be numerous, or should recurrence take place, it is best to shave off the surface of the tonsil with a tonsillotome (see p. 132).

## ACUTE PHARYNGEAL ABSCESS.

The pharynx consists essentially of a fibrous bag or framework, to which the name of pharyngeal aponeurosis is given. Internal to this is the mucous membrane which is supplied with abundance of lymphoid tissue and numerous mucous glands. The mucous membrane is continuous with that of the other cavities which open into the pharynx. The muscles of the pharynx are outside the aponeurosis, and are separated from those on the front of the bodies of the vertebræ by the strong prevertebral fascia, which stretches from one sterno-mastoid muscle to the other. Behind this fascia and resting on the prevertebral muscles are the retro-pharyngeal glands, which are well developed in children, but may be absent in later life.

The only acute inflammatory affection of the pharynx which needs a separate description is suppuration following an acute pharyngitis, which generally occurs in young children. This is really an abscess in the sub-mucous or lymphoid tissue of the pharynx, and is in the wall of the pharynx. Difficulty in swallowing occurs early, and is accompanied by considerable pain; examination of the throat shows that the dysphagia is caused not by a diffuse inflammatory condition of the mucous membrane, but by a localised swelling. The prominence usually occurs in the pharyngeal cavity, and it may be situated laterally. The condition is serious and if the abscess is of any size it interferes considerably both with deglutition and respiration. If left alone it bursts spontaneously into the throat and there is some danger that the patient may be asphyxiated if this occurs during sleep.

**TREATMENT.**—The abscess should be evacuated as soon as possible. This is easily done from the pharynx, and the cavity heals as rapidly as does that of any other acute abscess.

When asphyxia is imminent in a case of acute pharyngeal abscess, or



abscess from the outside ; there is not the same urgency as in the case of acute abscess. When the affection is due to spinal disease, great care is necessary in moving the head when the patient is under the anæsthetic, otherwise serious damage may be done.

*Operation.*—An incision is made just behind the posterior border of the sterno-mastoid, commencing above at the mastoid process and running downwards for about an inch and a half. This incision is deepened until the deep fascia is opened behind the muscle, the posterior border of which is hooked up with a retractor ; some enlarged glands may require removal before the posterior border of the sterno-mastoid muscle can be defined. The finger is then introduced into the wound and feels for the transverse processes of the cervical vertebræ, and a blunt dissector is gradually insinuated behind the vessels until the abscess cavity is reached ; this is facilitated by keeping one finger upon the abscess in the mouth so as to ascertain the right direction in which to work. If the instrument is kept close to the anterior surface of the transverse processes and made to bore directly into the abscess cavity, no difficulty is encountered and the abscess can be opened in a few seconds. The channel is enlarged by introducing a pair of dressing-forceps along the dissector and carefully expanding the blades in the vertical direction. The finger may then be insinuated into the abscess cavity and the state of matters explored. Hæmorrhage rarely occurs during the operation, but if it does it is venous and ceases as soon as the pus is evacuated. The cavity should be scraped out with a flushing-spoon, great care being taken not to exercise any pressure against the pharyngeal wall lest perforation should occur. If the case is one of spinal disease, the bone may also be scraped and any sequestrum which is present removed. Iodoform and glycerine is then injected, the wound stitched up, and the treatment appropriate for the spinal disease gone on with (see Vol. III. p. 294).

The abscess should never be opened through the anterior triangle as is sometimes recommended. It is extremely difficult to reach the abscess cavity by this route, as the vessels have to be carefully defined and pushed out of the way, and considerable bleeding and a tedious operation may result.

#### GRANULAR PHARYNGITIS.

This condition is marked by enlargement of the lymphoid follicles at the back and sides of the pharynx ; it is often associated with enlargement of the tonsils and adenoid vegetations in the naso-pharynx. The condition is common in public speakers, and is one of the most frequent causes of the affection known as ‘clergyman’s sore-throat.’ Its principal symptoms are perversions of sensation in the pharynx, cough, hawking-up of mucus, hoarseness, a feeling of tiredness and sometimes loss of voice.

*TREATMENT.*—*When the follicles are much enlarged*, an effectual method is to destroy them with the electric cautery. The posterior wall of



Locally calomel and starch powder are of great value, or the ulcers may be painted with chromic acid solution (gr. x to xx to the ounce) after having been carefully dried.

The **tertiary forms** are the most serious on account of the rapid destruction of tissue often caused by them, and they are common on the pharynx as well as on the soft palate. Gummata form and break down rapidly, leading to deep ulceration of the mucous membrane. Unless the condition is arrested quickly, the ulceration may extend and lead to extensive cicatrisation and stenosis of the pharynx. The soft palate may become adherent to the posterior pharyngeal wall, and may thus obstruct or entirely obliterate the connection between the naso-pharynx and the pharynx proper.

In **congenital syphilis** similar lesions are not very uncommon.

Immediate and energetic *treatment* is called for on the lines laid down above.

During healing every effort should be made to prevent stenosis of the pharynx and adhesion of the soft palate, but it must be admitted that this is excessively difficult. Bougies should be passed frequently into the naso-pharynx, but if the ulceration has extended on to the edge of the palate it is almost impossible to prevent considerable closure.

### STENOSIS OF THE PHARYNX.

This affection may be due to a variety of causes, of which congenital or acquired syphilis is by far the most frequent ; it follows burns, scalds, the action of corrosive substances, and ulcerations such as lupus. It is most common in the upper part of the pharynx and is generally associated with adhesion of the soft palate to the posterior pharyngeal wall. Slight adhesions in that situation may not give rise to marked difficulty either in deglutition or articulation, but both these actions are affected when the adhesions are extensive, the patient having a pronounced nasal voice, and deglutition being very difficult ; the food constantly returns through the nose owing to imperfect action of the soft palate. Should the stenosis affect the lower part of the pharyngeal wall, deglutition may be interfered with in another way ; there may be some degree of actual stenosis, giving rise to a condition very similar to stricture of the upper part of the œsophagus.

**TREATMENT.**—The treatment of adhesions of the palate and stenosis of the pharynx is very difficult. When the palate is adherent there is a constant tendency to recurrence in spite of repeated operations to divide the adhesions, and no plastic operation is likely to be entirely successful. All that can be done under the circumstances is to divide the adhesions between the palate and the pharyngeal wall with scissors or a blunt-pointed bistoury, taking care to do this slowly so as to avoid the possibility of doing damage to vessels which may have been dragged





glands are usually enlarged and caseous, and the ulcers cause the patient intense pain on swallowing. Death generally occurs before long from exhaustion.

**TREATMENT.**—The *general treatment* suitable for tuberculosis (see Vol. I. p. 231) must be adopted, and it is hardly ever worth while to adopt any radical treatment, even were it feasible, since the ulceration is usually accompanied by advanced tuberculosis elsewhere. Tuberculin injections (see Vol. I. p. 522) should be used.

The *local treatment* is mainly directed to the relief of pain, and this is best done by blowing orthoform on to the ulcerated surface about half an hour or more before meals. Should orthoform fail to relieve the pain, a 25 per cent. solution of menthol in parolein in an atomiser, or a spray containing cocaine or morphine, may be used.

If the ulceration is limited and the patient's general condition is good, the ulcers may be scraped with a sharp spoon after cocainising the surface thoroughly. This is particularly called for when the pain on swallowing is intense. Should this fail to give relief, pure lactic acid may be brushed over the ulcerated surface every day for a fortnight or longer; the surface of the ulcer should be well cocainised before the application as it often causes intense pain. As a result, healthy granulation may be produced and the ulcer usually ceases to cause much pain, although it may not cicatrise. Should the pure lactic acid fail, the ulcer may be touched once or twice a week with undiluted carbolic acid; besides its antiseptic action, the acid has a powerful anæsthetic effect.

Stenosis may follow the cure of this affection and may call for appropriate treatment (*vide supra*). Unless there is actual ulceration, no local treatment is required; should it be necessary, it will be similar to that just described.

## TUMOURS OF THE TONSIL AND PHARYNX.

These are best considered together because a malignant growth arising in the tonsil constantly tends to encroach upon the neighbouring part of the pharynx and *vice versa*.

### BENIGN TUMOURS.

**Papillomata** may occasionally be found about the margin of the fauces and the uvula. **Adenomata** are not infrequently met with on the soft palate and were at one time mistaken for carcinoma. **Myomata, fibromata, or lipomata** are very rare and do not give rise to any trouble except by their bulk. Sometimes, however, these tumours—and especially the myomatous form which occurs somewhat lower down in the pharynx—become pedunculated and give rise to a pharyngeal polypus which interferes with deglutition and, if large, with respiration.

**TREATMENT.**—A small tumour of this kind will probably pass



from them. The tumour usually grows extremely rapidly, and fills up the entire pharynx. The interference with breathing and swallowing is increased by the constant collection of tenacious mucus at the back of the throat.

**Treatment.**—This consists of early removal both of the growth and the enlarged glands. The methods of operating and the after-treatment are similar to that for carcinoma (*vide infra*).

**EPITHELIOMATA** are met with in any part of this region. They frequently spread from the back of the tongue to the anterior pillar of the fauces and the tonsil; in other cases they spread in the reverse direction, commencing in the tonsil and subsequently infiltrating the tongue. They may also spread from the tonsil to the soft palate. When they commence at the lower part of the tonsil, or when they spread from the tongue to that situation, they rapidly extend downwards and involve the aryteno-epiglottidean folds and side wall of the pharynx. Sometimes the tumour is entirely pharyngeal, and in that case it usually commences fairly low down just behind the tonsil. Lastly, the anterior pharyngeal wall may sometimes be affected, the growth occurring behind the cricoid cartilage either as a primary mass or as a secondary extension from the larynx.

As in the sarcomata, the symptoms may be very slight, even though the tumour has attained a considerable size. In some cases, the first thing to attract the patient's attention is the presence of an enlarged gland in the neck, and there may be a large mass of hard fixed glands secondary to a small growth, which is situated in some remote and almost invisible portion of the pharynx. The glands involved are those situated in the upper part of the anterior triangle of the neck, and those deep to the sterno-mastoid muscle.

**Treatment.**—In connection with the treatment of both sarcomata and epitheliomata various points arise.<sup>1</sup> In the first place the advisability of performing an operation at all must be considered and after that the method by which it should be done.

**The advisability of operating at all** must be decided partly by the extent of the disease and partly by its situation. The more extensive the growth, the less favourable is the result of operation, especially when the disease is in the pharynx. Extensive enlargement of the glands in the neck is not however a serious bar to operation, as we have already pointed out in connection with cancer of the tongue (see p. 77), because the glands may be successfully removed, even if large and adherent to the carotid sheath. *The extent of the disease in the throat*, however, is a very different matter. If the patient survives an extensive operation a large wound is left which secretes pus for a long time, and distortion of the

<sup>1</sup> The question of operation in malignant disease of the pharynx and its results will be found fully discussed in the Lettsomian Lectures for 1896 by W. Watson Cheyne.







exposed to sepsis, and the risk of secondary hæmorrhage is consequently extremely great. Indeed, the collected cases of various surgeons show that the majority of those in which the external carotid has been tied under these circumstances have died from secondary hæmorrhage. Experience shows that the bleeding during the operation is not so severe as to necessitate this procedure and, with a preliminary tracheotomy and the use of Hahn's tube, it need not give rise to any anxiety. The operation should be so planned that the access to the tumour from the outside is good and that the surgeon is enabled to see and seize the bleeding points as they are divided. It is seldom necessary to employ temporary compression of either the common or external carotid.

**The methods of gaining access to the primary disease.**—No definite incisions or precise methods can be laid down for these operations, as the surgeon must plan out the operation for each individual case. We shall, however, endeavour to indicate some of the chief points in connection with them.

**Removal from within the mouth**—The disease can very rarely be removed without an external incision, or at any rate without making the incision in the throat communicate with that for the removal of glands in the neck ; if this can be done, however, the operation is a much safer one. As an example we may quote a small epithelioma at the junction of the soft palate and the upper part of the tonsil which does not infiltrate the tissues deeply, or an epithelioma on the anterior pillar of the fauces or towards the front of the tonsil, or some cases of small epitheliomata occurring at the edge of the tongue with a tendency to extension on to the anterior pillar of the fauces. We have removed growths in all these situations from the mouth without opening the neck.

*Splitting the cheek.*—Access to the disease in this situation is greatly facilitated by splitting the cheek. No doubt removal can sometimes be effected without doing this, but we should not advise that procedure. To split the cheek from the angle of the mouth to the anterior border of the masseter does not add to the gravity of the operation, nor does it cause much subsequent deformity, especially in the male, while it renders the disease about the anterior pillar of the fauces or the velum palati much more accessible.

*Removal by the thermo-cautery.*—We have come to the conclusion that the thermo-cautery is the best method of removing the growth in the cases above referred to. Not only is there little bleeding, but the heat of the cautery destroys any cancerous epithelial cells which may be spreading superficially, and thus adds an additional safeguard against recurrence. At the same time the operation leaves an eschar from which there is little exudation, so that there is not nearly the same amount of discharge at first as there would be from a clean-cut wound. The disadvantage is that the edges of the wound cannot be stitched together ; but, as we only recommend the cautery for small growths,





with it. The subsequent proceedings will vary with the situation of the growth. When it is on the lateral wall of the pharynx it will be immediately beneath the finger just below the digastric muscle, and all that is necessary is to retract the vessels and expose the pharyngeal wall, taking care to avoid injuring the superior laryngeal nerve. An incision is then made into the wall of the pharynx to one side well away from the growth, and the disease cut away with curved scissors, the wound in the pharynx being afterwards sutured as described on p. 153.

When the disease is situated higher up, especially when it is in the tonsillar region, freer access is necessary. When the lower portion of the tonsillar area is affected, the digastric and stylo-hyoid muscles should be divided, taking care to leave the hypoglossal nerve intact, and the jaw is pushed well forwards so as to expose the tonsillar region. The pharynx is then incised behind the growth and well free of it at a point best ascertained by introducing the finger into the mouth. The disease in the pharynx is thus exposed and can be removed.

When the disease runs fairly high up it may suffice to split the cheek as far out as the masseter in addition to the procedure just described, so as to detach the upper part of the disease satisfactorily from above.

When, however, the disease extends high up and affects the whole of the tonsillar region, it is better to divide the lower jaw. Curiously enough the mortality in the cases in which the lower jaw has been divided is considerably less than those in which it was not done. The reason seems to be that secondary hæmorrhage was more frequent in the latter cases, probably from imperfect ligature of vessels at the operation owing to the less perfect exposure of the wound. The jaw may be divided in front of the masseter or above the angle. When the jaw is divided in front of the masseter the whole tonsillar area and side of the pharynx are exposed to view after the posterior belly of the digastric and the stylo-hyoid muscles have been cut across, and the disease can be removed as easily as if it were upon the surface. In this operation the soft parts are dissected well up before the jaw is sawn through.

When the disease is situated farther back, the jaw may be divided above the angle, leaving the attachment of the masseter below, and it is a good thing to remove the ascending ramus of the jaw (see Fig. 54). If the angle and the ascending ramus are removed, the functional result is bad, as the jaw is pulled to that side ; but if the division is made above the angle, the ascending ramus may be removed without causing much disability and an excellent view of the operation area is obtained when the jaw is pulled well forwards. In some rare cases Langenbeck's division of the jaw (see p. 95), already referred to in speaking of cancer of the tongue, may be of value ; usually, however, it is not necessary to have such an extensive incision.

When the tumour is situated about the base of the tongue, the disease may be readily got at from outside by removing the great cornu of the



## CHAPTER XII.

### THE SURGICAL AFFECTIONS OF THE ŒSOPHAGUS.

IN a person of average height the Œsophagus is about nine inches in length and extends almost vertically from the lower border of the cricoid to the level of the ensiform cartilage ; the landmarks behind are from the fifth cervical to the ninth dorsal vertebra. In front of the upper part of the Œsophagus is the trachea ; lower down are the left bronchus, the arch of the aorta, the pericardium, and the left vagus. Behind, it rests mainly upon the vertebral column and the thoracic duct, but about three inches above the diaphragm it crosses the aorta. The pleura lies on each side of the Œsophagus, and the right pleura sends a prolongation behind it above, so that it is not easy to reach it on the right side in that situation without damaging the pleura. Above the arch of the aorta the Œsophagus is best reached from the left side ; below the arch, from the right side.

The total distance from the upper incisor teeth to the stomach averages 16 inches. The distance from the upper incisor teeth to the commencement of the Œsophagus, *i.e.* the lower border of the cricoid cartilage, is about  $6\frac{1}{2}$  inches, to the bifurcation of the trachea about 11 inches, and to the point at which the aorta crosses the Œsophagus about 12 inches. These measurements are very variable.

### MALFORMATIONS.

A number of congenital malformations may be met with for which practically nothing can be done, and which need no description here ; for example, communications between the trachea and the Œsophagus, congenital constrictions of the Œsophagus, and imperforate gullet.

### ŒSOPHAGEAL DIVERTICULA.

This condition is similar to that met with in the pharynx (see p. 119), and most of the pouches of supposed Œsophageal origin are situated at the upper part of the tube and probably originate from the pharynx.

What has been said with regard to the symptoms, diagnosis, and treatment of pharyngeal pouches applies also to these diverticula.



as possible ; then, rapid healing of the ulceration of the œsophagus must be favoured ; finally, the constriction which is certain to occur subsequently must be prevented or diminished.

*Neutralisation of the caustic.*—If a mineral acid has been swallowed, powdered chalk or a solution of bicarbonate of soda should be administered, while vinegar and water should be freely given in the case of a caustic alkali. In carbolic acid poisoning, olive oil in large quantities is the best remedy.

*Treatment of the subsequent ulceration.*—The first essential is to insure rest to the œsophagus—partly to prevent the inflammation spreading through the œsophageal wall, and partly to promote cicatrisation. Hence *rectal feeding* (see p. 257) should be employed for as long as possible. The time will, of course, come when the patient must be fed by the mouth, but as long as his strength is fairly well maintained, this should be delayed : water may, however, be permitted in small quantities at a time. When the time comes for feeding by the mouth, it is well to begin with milk ; as healing progresses, swallowing becomes less painful and feeding by the mouth may be increased, solid or semi-solid materials being employed.

The *pain*, which is always very marked on account of the constant swallowing of the saliva, is best relieved by the administration of *morphine* (gr.  $\frac{1}{2}$  in an ounce of glycerine and water) ; a few drops placed on the back of the tongue and allowed to trickle down the gullet has a good local effect. An emulsion containing bismuth carbonate (gr. xv) and orthoform (gr. j or ij) to the ounce is useful in alleviating the pain ; anodyne lozenges may also be sucked.

*Prevention of contraction.*—Contraction becomes evident in about three or four weeks after the separation of the sloughs, and from this time onwards efforts must be made to prevent it by passing bougies (see p. 173). The best form of bougie for the purpose is the conical black one which easily passes along the canal, while the gradual thickening of the instrument from the point upwards distends the œsophagus very gradually. The bougie is softened before being passed by placing it in hot water and is then well lubricated with butter. When there is much spasm, the pharynx should be anæsthetised with a 10 per cent. solution of cocaine. Several bougies in series should be at hand, and a good size to begin with is No. 14 ; the dilatation should not be held to be complete until a No. 24 has been introduced, but this size may not be reached until after several sittings. An interval of a week may be allowed to elapse between each sitting unless the contraction is considerable when the bougies should be passed twice a week. As soon as the contraction becomes stationary, the interval is gradually increased, but the treatment must be kept up for the remainder of the patient's life, otherwise contraction will recur.

The treatment of a simple stricture of the œsophagus after the ulceration has healed, is described on p. 173.



Various measures may be taken to determine the presence and exact situation of the foreign body. When it is opaque to the X-rays, these are a ready and certain means of diagnosis. When, however, the body is not opaque to the rays, an olive-headed œsophageal sound (see Fig. 55) may be employed. This is passed down the œsophagus until the obstruction is reached, but no attempt should be made to dislodge the body by the instrument. When the body has been located, a small instrument should be passed and if possible insinuated beyond it, so that its size may be made out. The direct-vision œsophagoscope is a very valuable method of investigating the state of matters and should always be employed if it is available (see p. 163).

After the position and nature of the foreign body have been ascertained an attempt should be made to remove it, either by making it traverse the œsophagus and enter the stomach or by withdrawing it through the mouth or through an opening in the neck. While care should be observed in the manipulation of any foreign body in this situation, special precautions must be taken if it has remained *in situ* for some time, because inflammatory softening of the œsophageal wall may have taken place, and consequently there will be a risk of damage to the œsophageal wall and other important structures during the attempts to remove it.

**Propulsion of the foreign body into the stomach.**—Boluses of food and smooth round bodies should be pushed down into the stomach, especially if they are situated at the lower part of the œsophagus. Small coins may also be similarly treated, if attempts to remove them with the aid of Killian's tubes and forceps, or to hook them up with a coin-catcher, fail. This is done by passing a full-sized sponge probang (see Fig. 56) down into contact with the foreign body and then slowly and steadily pushing it on into the stomach; if done gently and steadily, this may not cause pain. The most difficult

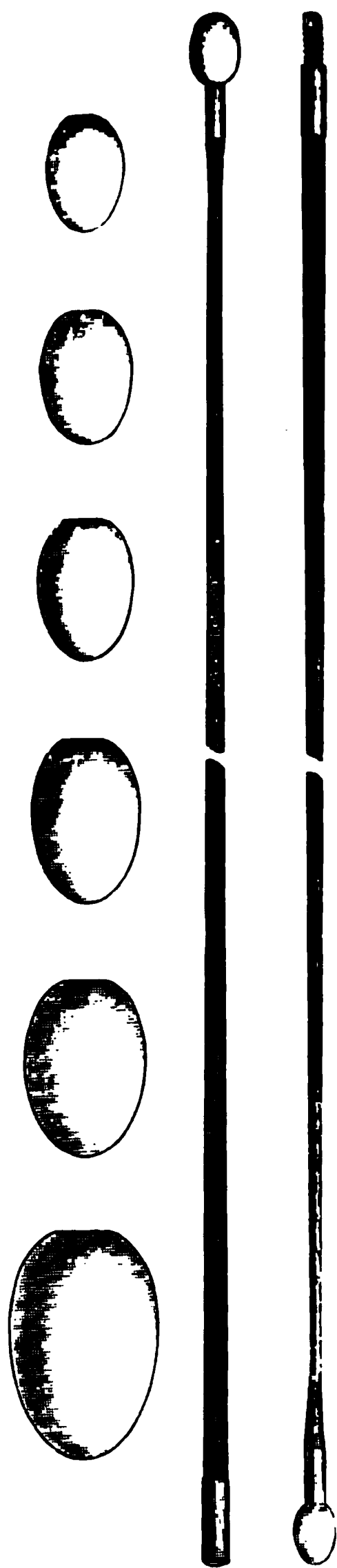


FIG. 55.—(ŒSOPHAGEAL SOUNDS. This stem is made of whalebone and is flexible. The bulbous ends are made of aluminium and screw on and off the stem, so that one size is easily substituted for another.









been securely seized. It may even be necessary to break up the foreign body, *e.g.*, a tooth-plate, before it can be extracted.

When an œsophagoscope is not available other methods must be employed. When high up in the œsophagus or partly in the œsophagus and partly in the pharynx, attempts may be made to remove the body with forceps (see Fig. 59). In the case of small, smooth bodies the administration of an emetic, such as a subcutaneous injection of apomorphine hydrochloride (gr.  $\frac{1}{4}$ ) may lead to the expulsion of the foreign body, but this method should not be employed unless the foreign body is quite

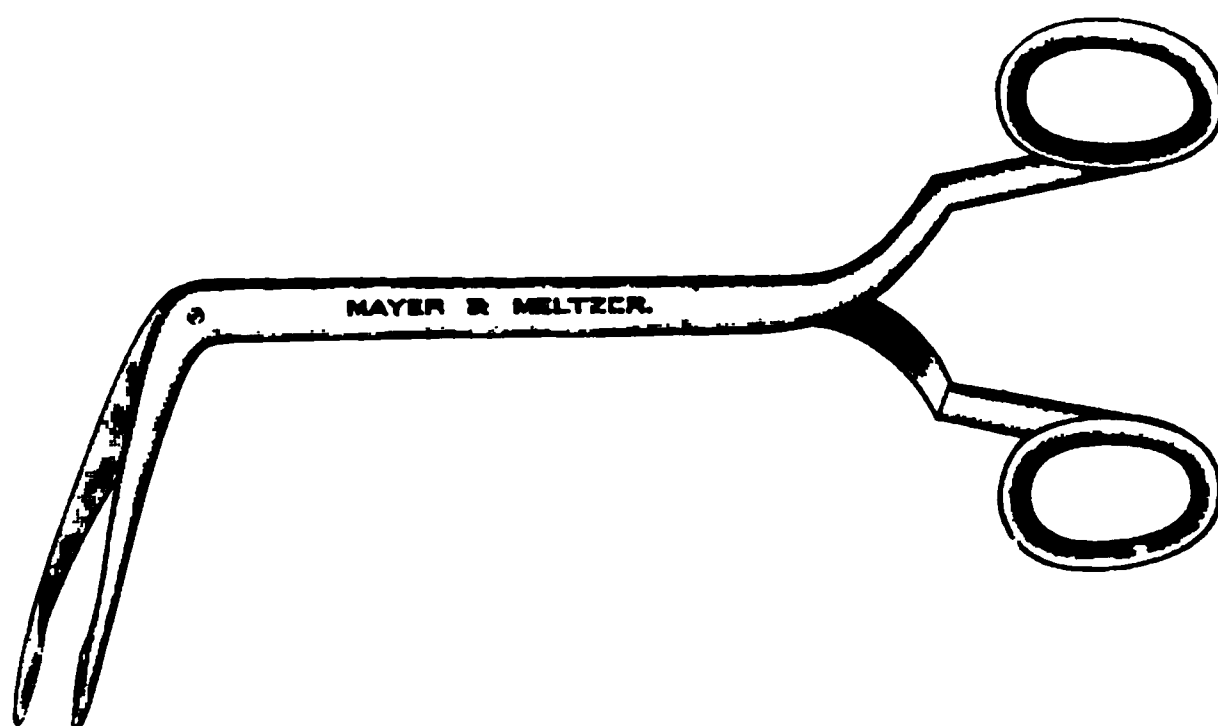


FIG. 59.—ŒSOPHAGEAL FORCEPS.

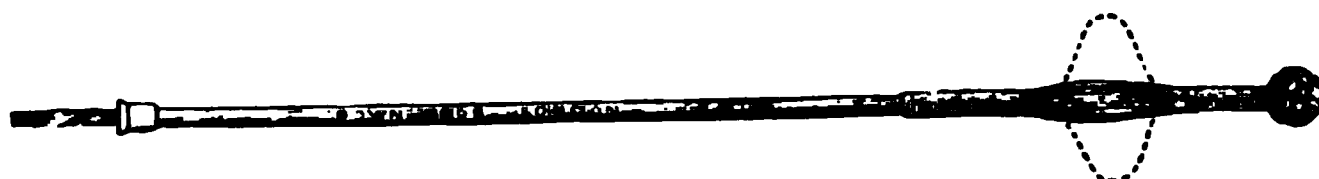


FIG. 60.—EXPANDING OR 'UMBRELLA' PROBANG. At the tip is a piece of sponge. The horse-hair 'brush' is made to expand (see dotted line) by pulling upon the whale-bone end.

small and free of projections. The same remark applies to the inversion of young children.

When the foreign body is sharp and pointed and not opaque to the X-rays, such as a fish-bone, the umbrella or sweep's-brush probang of Fergusson (see Fig. 60) is useful. The instrument is passed closed beyond the supposed situation of the foreign body in the same manner as the ordinary probang. It is well to pass it to its full length, so that its lower end reaches the cardiac orifice of the stomach. By traction upon the whale-bone end, the sweep's brush is then made to project and the expanded instrument is withdrawn. The bristles catch and dislodge the foreign body, which becomes entangled in them and is withdrawn through the mouth. Extreme gentleness is essential.







method and turned over on his face and a flap raised towards the middle line on the left side of the spine. Portions of three ribs are resected without damaging the parietal pleura, which is pushed aside with the finger. The foreign body may then be felt and an incision for its extraction made over it ; if it cannot be felt, the œsophagus may be opened on a bougie and the body reached by forceps or the finger.

The great danger of the operation is the risk of fatal mediastinal suppuration. It is almost impossible to suture the œsophagus accurately, and, in addition, the wound becomes contaminated when it is opened ; at the same time, however, it must not be forgotten that a foreign body impacted in this situation will ultimately cause a fatal result, and it is almost imperative to give the patient the chance that this operation offers.

### INFLAMMATORY AFFECTIONS.

We distinguish between an œsophagitis and a peri-œsophagitis, according as the inflammation is actually in the œsophageal wall or in the tissues around.

**Acute œsophagitis** is very rare except as a complication of injury, such as may be produced by foreign bodies or by swallowing caustics. The œsophagus may become acutely inflamed in septic conditions of the mouth, thrush, diphtheria, and the like, but the condition is one of great rarity.

**Chronic œsophagitis.**—This may follow upon an acute inflammation ; it is common in the portion of the œsophagus above a stricture and may then considerably increase the dysphagia and the pain.

**Peri-œsophagitis** or inflammation of the cellular tissues around the gullet may occur from perforations of the œsophageal wall or may spread from inflammatory foci in the neighbouring tissues such as the glands or the spine.

**TREATMENT.**—This will consist in incising any large inflammatory swelling or evacuating any abscess that has formed. Tracheotomy may be required in bad cases.

### TUBERCULOSIS.

This is a very rare affection in the œsophagus, and only a few cases are on record. The condition gives rise to very indefinite symptoms, dysphagia being the most marked ; as a rule the cases are mistaken for cancer. Little can be done in the way of local treatment ; general treatment must be carried out on the lines laid down in Vol. I.





The most common cause is the ulceration due to swallowing a caustic fluid, and the ulceration occurs irregularly over the mucous membrane, is most marked at the upper and lower ends of the œsophagus, and varies considerably in depth and extent. This leaves an irregular fibrous stricture, in which considerable tracts of healthy mucous membrane are divided from one another by cicatricial bands. The obstruction to the passage of food commences early, is very marked, and increases rapidly. The irregularity in the distribution of the cicatricial tissue also tends to make the treatment of the affection by the passage of bougies a matter of extreme difficulty.

*Diagnosis and localisation of the stricture.*—Before commencing treatment, an exact diagnosis should be made and the precise limits of the obstruction should be ascertained. After the presence of an aneurysm has been excluded, the œsophagus is explored with an olive-headed bougie (see Fig. 55), which consists of a metal bulb attached to a flexible whalebone shaft. The metal bulbs are of different sizes and are made to screw on and off. A full-sized bulb (No. 24) should be used in order to detect whether there is a stricture or not, and also the exact distance of its upper end from the teeth. This is important, because a small instrument may pass through a comparatively insignificant stricture and may not be arrested until it reaches one of smaller calibre lower down. When the first sound is arrested, the measurement to the upper incisor teeth is taken and a smaller bulb substituted. Should this fail to pass the obstruction, a smaller size still is employed, until one is found that passes through the stricture into the stomach. When this has happened, the sound is slowly and cautiously withdrawn, until the upper edge of the metal bulb catches against the lower edge of the stricture, and then the distance of this point from the upper incisor teeth can be ascertained. By these means the situation of both the upper and lower extremities of the stricture and the length of the obstruction can be determined. It is usual to have the shaft of the bougie graduated so as to get an exact measurement.

Valuable information as to the position, length, and calibre of the stricture may also be obtained by means of the X-ray fluorescent screen. The patient stands with the screen in front of his thorax. A cachet of bismuth is given, and its passage down the œsophagus is observed on the screen. When it reaches the upper limit of the stricture, the cachet will be arrested. Another method is to cause the patient to swallow a thick emulsion of bismuth oxychloride. As the emulsion passes down, it adheres to the œsophageal walls, and will show on the screen and in a radiogram a broad or narrow streak, according to the size of the lumen of the œsophagus. The situation and character of the upper end of the stricture can also be well demonstrated by means of the œsophagoscope, and the presence of ulceration, or malignant disease can be ascertained in this way.



be discontinued, and the patient must either pass them himself or have them passed for him at intervals for the rest of his life.

The best bougie for the purpose of intermittent dilatation is probably the silk-web form, which is quite safe and with which it is practically impossible to do any damage. The more solid forms are somewhat more dangerous, especially when there is any ulceration. It is important not to use too small an instrument at the first sitting ; the best plan is to try one of full size (No. 24) and to work downwards until a size is found that will pass the stricture. The bougie should be softened by immersing it in boiling water and the instrument should then be lubricated with butter or glycerine ; the former is preferable, as some patients object to the sweet taste of the glycerine. The pharynx and the laryngeal aperture may be painted with a 10 per cent. solution of cocaine in order to lessen the spasm as the bougie passes over the glottis. The patient sits facing the surgeon in a chair with a high back or against the wall, the head being so supported that it cannot be drawn back, The hard palate should be horizontal and the mouth wide open. The instrument is passed well back into the pharynx without touching the dorsum of the tongue and pressed against the posterior pharyngeal wall, when the softened tip bends easily and the instrument find its way down the pharynx. If preferred, a slight downward bend may be imparted to the tip of the instrument before it is passed, and this is advisable in the case of the larger instruments, so as to avoid undue pressure on the posterior pharyngeal wall ; with the smaller sizes it is unnecessary. As the bougie passes the region of the glottis there is usually considerable spasm, the patient coughing and choking, but this only lasts for a few seconds and is greatly diminished by instructing the patient to bend the head well forward so that the saliva runs out of the mouth, and to take a few deep inspirations ; this rapidly checks the spasm, and when the point of the bougie has passed beyond the laryngeal aperture the spasm soon ceases. The instrument should be passed down the œsophagus slowly and steadily without using any force, otherwise spasm is easily set up and greatly embarrasses the procedure. The application of cocaine to the fauces and posterior pharyngeal wall usually abolishes the spasm entirely.

When the stricture is reached, careful attempts are made to insinuate the bougie through it, much in the same way as in the case of a urethral stricture ; if force is used, the point of the instrument may either penetrate the œsophageal wall or may curl upon itself and return through the mouth. It can generally be ascertained whether the bougie has found its way into the stricture by feeling that its point is grasped, that is to say, it cannot be pulled out readily. When this is the case and the instrument cannot be passed on through the stricture without using undue force, the best plan is to leave the bougie in position for five minutes, the patient in the meantime bending the head well forwards over a basin to allow the saliva to escape ; the bougie is then withdrawn. No attempt should







question of how to treat the wound in the stomach after a bougie has been successfully passed through the stricture is a matter of importance. Perhaps, on the whole, it is best to conclude by performing a gastrostomy such as Witzel's or Kader's (see p. 184), which will close spontaneously if the treatment of the stricture is successful, but which can be used permanently should it fail.

*Gastrostomy.*—When a patient suffering from extensive and impassable stricture is unable to take sufficient food to support life and is brought almost to the verge of starvation, gastrostomy is called for to avert impending death. Not only does this operation enable the patient to obtain nourishment, but also it is often found that the rest given to the œsophagus by the artificial opening into the stomach is followed by considerable improvement in the stricture, and not infrequently improvement in swallowing occurs in a few days.

This is probably due to diminution of congestion and spasm resulting from the rest. While gastrostomy is absolutely necessary to save the patient's life and to keep up his strength, it should only be looked upon as a temporary measure, and fresh attempts should be made after a week or two to dilate the stricture from the mouth (see p. 173). When once the stricture has been dilated, the gastrostomy opening may be allowed to close, or, if necessary, an operation may be performed for its closure. The operations of gastrostomy are described on p. 184; for the cases under consideration we recommend Witzel's or Kader's, which are not only efficient, but have the advantage that the fistula produced, is always ready to close when the tube is left out, so that, when sufficient dilatation of the stricture has been obtained, it is only necessary to discontinue passing the tube through the gastric fistula.

#### SPASMODIC STRICTURE.

Spasm of the œsophagus is an affection chiefly met with in women between the ages of twenty and thirty. It may occasionally occur in older subjects about the menopause. As a rule the trouble is neurotic and only part of the general condition. The diagnosis is of the greatest importance, as the surgeon must be very careful that no organic lesion is present. The age of the patient, her neurotic temperament, the absence of hæmorrhage or signs of ulceration, the varying tightness of the stricture under different conditions, and the fact that, at any rate under an anæsthetic, a full-sized bougie can be passed into the stomach without encountering any obstruction, and that solids are often swallowed more easily than fluids, are the principal points in the diagnosis.

**TREATMENT.**—This consists essentially in the employment of medical, hygienic, and dietetic measures suitable for neurotic subjects. Antispasmodic drugs like atropine, bromide of potassium, or valerian





The tumour infiltrates the muscular walls and affects the surrounding structures or the glands in the lower part of the neck or mediastinum comparatively early. When situated high up, it may ulcerate into the trachea and give rise to a fistulous communication between the œsophagus and the air-passages. Lower down it may attack the wall of the aorta and lead to fatal hæmorrhage. In other cases again it may spread by direct extension to the lungs, or communicate with the mediastinum and lead to septic mediastinitis. Various pressure symptoms may occur from implication of nerves in the neighbourhood.

After symptoms of stricture have become manifest, the life of the patient is comparatively short ; death usually occurs in three or four months unless means are taken to feed the patient artificially ; even after gastrostomy, the patient usually dies within a year from the commencement of the symptoms and generally earlier. The fatal result may be due to marasmus or to complications such as septic broncho-pneumonia from ulceration into the trachea, hæmorrhage, mediastinal suppuration, or tuberculosis ; the latter disease seems to be common in cases of stricture of the œsophagus, whether simple or malignant.

The chief *symptom* is dysphagia accompanied by loss of strength often out of all proportion to the inability to take food ; it is quite common to find a patient able to take a large quantity of liquid nourishment and, in spite of this, emaciating to a very marked degree. Pain is frequently absent, but coughing and the expectoration of mucus may be troublesome symptoms ; there are the usual signs of stricture of the œsophagus, frequently combined with those of ulceration, and there is an absence of any history of injury. The onset is usually gradual, but may be very rapid. When the growth is situated near the commencement of the œsophagus, the air-passages may become implicated, and the recurrent laryngeal nerve is not uncommonly paralysed on one or both sides. The diagnosis is made by the use of bougies, by means of the œsophagoscope, and by the X-ray screen and radiograms.

**TREATMENT.**—The treatment of cancer of the œsophagus is at the present time almost entirely palliative. Excision has been practised for growths occupying the upper end of the tube, and in a few cases the patients have recovered from the operation, but recurrence has ensued. In the most of the cases that have been operated on, the trachea has also been involved, so that the operation has been practically an excision of the œsophagus and the larynx combined. Accidents have happened after operation from food passing into the trachea, and in all the cases death has occurred in a few months. Considering the fatality of the disease, the formidable character of the operation, the great mutilation and the short relief afforded to the patient, these operations do not seem advisable.

The treatment must therefore be directed to maintaining the patency of the œsophagus as long as possible and relieving the various symptoms



varying with the size of the stricture, and terminating above in an expanded funnel-shaped opening, while below it is furnished with a terminal opening. To the funnel-shaped end silk threads are attached which are brought out through the mouth and fastened round the ear. The tube is inserted upon a special holder until it has passed well into the stricture, the funnel-shaped end resting upon the upper surface of the growth and preventing the tube passing right through. The largest sized tube that will go through the stricture should be chosen, the size of the stricture having been previously ascertained by the passage of a sound. All these tubes should be furnished with a terminal opening, as blockage is apt to occur if the opening is lateral, either from lateral pressure against the stricture or from a collection of food in the blind end. The tube is introduced upon its guide exactly as is a long Œsophageal tube, and when it is in place the guide is withdrawn and the silk threads are passed between two of the teeth and fixed

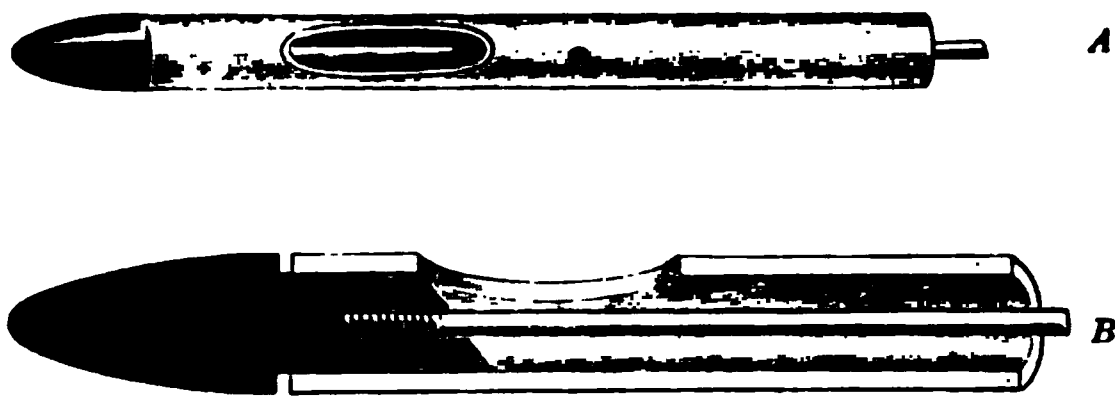


FIG. 65.—DR. WILLIAM HILL'S PERMANENT ŒSOPHAGEAL TUBE. This tube is intended to be worn continuously in cases of stricture of the Œsophagus. It is of soft india-rubber fitted with a vulcanite end to facilitate introduction and a malleable silver stylette, the proximal end of which may be attached to a denture or bent round the patient's ear to keep it in position. The stylette also prevents the tube from being coughed or vomited up. *A*, represents the tube full size ; *B*, gives enlarged details of construction.

around the ear. It is difficult to prevent the threads from being bitten through, and the most satisfactory way is to substitute a piece of silver wire for the upper part of the silk. The end of this may be either hooked round the necks of the teeth or may project from the mouth and be fastened to a button outside the lips.

The advantage of these tubes is that they enable the patient to swallow his food, and they avoid the accumulation of saliva that is so distressing. The patient can also taste his food. Unfortunately, however, their usefulness is limited. On the one hand the tubes are more difficult to introduce than the ordinary long form, and it is not uncommon to fail to pass them when the long tube goes in comparatively easily ; this, however, is mainly a matter of practice. A point of greater importance is that, in certain situations, they can only be retained a short time owing to the pressure and irritation that the funnel-shaped end produces. This is particularly the case when the growth is situated at the upper end of the Œsophagus, the expanded part of the tube then pressing upon the































further reason for operation is that when a muscle is completely torn across, the ruptured ends curl up, so that the smooth outer surfaces of the muscle are opposed, and these unite very imperfectly. The method of suture of muscles is described in Vol. II. p. 63.

*When the rupture occurs in the course of disease*, such as typhoid fever, we have to deal with degenerated muscular fibres, and the chances of sound healing after suture are comparatively slight, quite apart from the fact that the patient is probably not in a condition to stand an operation. Operation is also not so necessary in these cases, because the ends of the degenerated muscle do not tend to curl up as do those of a healthy muscle. We do not therefore suggest operation here.

#### NON-PENETRATING ABDOMINAL WOUNDS.

These may be inflicted with a sharp instrument, such as a knife or a bayonet, by bullets or by blunt instruments; in the latter case the wounds are contused. The important question in all wounds is whether the peritoneal cavity has been opened, and if so whether there is also injury of the abdominal viscera. In non-penetrating wounds of the abdominal wall there is little shock or bleeding, but the latter varies with the position and nature of the injury. Unless the wound becomes infected and suppuration occurs, the patient recovers rapidly.

**TREATMENT.**—The first point that should be ascertained in every case is whether the wound penetrates the peritoneal cavity. Before making a full examination the external wound and the skin around must be thoroughly disinfected, so as to avoid carrying infective material into the deeper parts of the wound and possibly into the peritoneal cavity; for it must be borne in mind that even when there is actual penetration, the instrument causing it may not have carried infective material further than the surface, especially if the wound is small. Instead of passing a probe to see if there is penetration of the abdominal wall, the wound should be enlarged so as to expose the opening in the muscles at any rate, and then the deeper parts should be disinfected before going further, taking care that no strong antiseptic gains access to the peritoneum; the condition of the parts beneath the muscles may finally be investigated. If no opening is found in the peritoneum, a small drainage tube should be put in at one end of the wound, and the muscles and skin sutured in layers. A stitch may be passed through the muscles opposite the point at which the drain emerges and its ends knotted and left long, so that it can be tied when it is certain that the wound is aseptic and that drainage may be safely discontinued; this is an important point, as, if a drain is left in longer than two or three days, ventral hernia is extremely likely to occur through the small opening left in the abdominal wall.

When the muscles are divided transversely to their fibres the skin wound must be opened up and the torn muscles stitched together as



however, if the abdomen is distended ; on the other hand its absence does not exclude rupture of the stomach or intestines. Symptoms of peritonitis soon set in and the condition of the patient becomes rapidly very grave ; the dyspnoea becomes intense, there is marked distension of the abdomen, the patient presents the typical abdominal aspect, and death occurs very rapidly. When the bowel has been injured but no extravasation of its contents has taken place, a localised peritonitis may occur and prevent infection of the general peritoneal cavity should perforation occur at a later date ; the result may then be the development of a limited abscess in the peritoneal cavity and the subsequent formation of a faecal fistula.

**TREATMENT.**—When the immediate symptoms are not urgent, and the diagnosis of an internal injury is not clear, it may be justifiable to wait for a time and to employ remedies for the shock (see Vol. I. p. 117) until the patient recovers slightly. If however the surgeon is in doubt as to the presence of internal injury, he had better make his preparations for operation at once ; and if by the time he is ready—which will probably be in about an hour—the condition of the patient has not improved, he had better proceed with the operation. If no injury is found, the patient will be little the worse, while if injury is present, delay may prove fatal. If the surgeon decides to wait, the question whether morphine should be given to relieve the pain and shock is a somewhat difficult one, because, though morphine tends to mask the symptoms, it is beneficial in immobilising the intestines, and thus diminishing intra-peritoneal extravasation should rupture have taken place. Unless, however, the pain is very severe, it is well to avoid its use ; but when pain is excessive, a small dose (gr.  $\frac{1}{4}$ ) may be given hypodermically. The patient should be kept lying on his back, with the knees flexed and tied together over a pillow, and nothing should be given by the mouth. If the phenomena of shock disappear in a few hours and no peritoneal or other symptoms arise, it may be presumed that no serious internal injury has occurred.

On the other hand, if the severe collapse, the small rapid pulse, and the subnormal temperature continue, if persistent vomiting sets in, or if there is increase of the pain and commencing distension, it is well to open the abdomen without delay. Should hæmatemesis, obliteration of the liver dullness or tympanites be present, operation is imperative. The abdomen should be opened by an incision close to the middle line unless the history or the symptoms make it almost certain that the injury is to one side. If, for instance, there has been a severe blow over the liver, the gall-bladder, or the spleen, rupture of one of these structures may be suspected, and it is then better to make the incision over the seat of injury.

**Exploratory laparotomy for abdominal contusions.**—In all these operations special attention must be paid to the diminution of shock. This



some clue as to the site of the rupture may be obtained by examination of the extravasated material ; thus a sour-smelling fluid containing undigested food without any faecal odour suggests a rupture of the stomach ; if the food is partially digested but devoid of intestinal odour, it is suggestive of injury to the duodenum ; if the material is distinctly faecal, the small intestine or the large must be examined first according to the characteristics of the material present ; the contents of the small intestine will be liquid and yellowish in colour, whilst those of the large bowel are semi-solid or contain hard masses and are dark brown or black. These points should be noted before the viscera are disturbed. The surgeon is often saved a tedious search, and the prospects of the patient are proportionately improved by the fact that in many cases the seat of injury lies immediately beneath the abdominal incision when this is made over the seat of the blow. Any injury severe enough to damage the intestine generally arrests the peristaltic action at once, so that the injured bowel lies in the position that it occupied at the time of the injury.

A wound of the stomach or intestine must be repaired in the appropriate manner. Sometimes the intestine is not only ruptured but is also so severely bruised as to render its recovery impossible, and it will then be necessary to excise the injured portion ; the technique of these various operations is described in connection with wounds of the stomach and intestines respectively.

*When neither blood nor intestinal contents are seen on opening the abdomen*, it is well to investigate the condition of the intestines before closing the wound, because the damaged portion may possibly have become displaced and covered in by healthy coils. The search must be made methodically and in the following manner. The first step is to raise the omentum so as to expose the intestines, for the omentum may prevent faecal material or hæmorrhage from the mesentery coming into view at once ; the intestines should next be gently pressed back from the abdominal wall, so as to allow the escape of any extravasated material from either side. If neither blood, intestinal contents, nor gas be thus found, the probabilities of a severe intestinal lesion are much diminished ; at the same time it is not advisable to close the abdomen without further inspection, because, on the one hand, a rupture of the intestine may be so small that the orifice is temporarily plugged by prolapsed mucous membrane, but will nevertheless lead to infection of the peritoneum if left untreated, or on the other, the mesentery may be so bruised and its vessels so injured that subsequent gangrene of the bowel will occur. Hence it is well to inspect the coils of the intestine methodically, but without allowing them to escape from the abdomen. First of all the surgeon slips his hand in towards the cæcum, and, grasping the extreme lower end of the ileum at that spot, he passes the entire small intestine through his fingers, coil by coil, packing each loop away towards the right side of the abdominal cavity as it is examined ; any injury to the intestine



time has elapsed before the surgeon is called in ; in the latter case, the protruded portion may have undergone profound alterations and contracted adhesions.

(a) **Treatment of recent prolapse.**—When the case is seen immediately after the occurrence of the injury, two problems present themselves. In the first place it is necessary to cleanse the protruded mass, which may be soiled either from contact with the ground or with the clothes, and if returned in that state would give rise to peritonitis. In the second place, when the protruded mass contains intestine it is necessary to ascertain whether the bowel has been injured ; as a rule the injured portion will be found in the protruding coils.

The first step is to disinfect the protruded mass and the surface of the abdomen and also the wound through which the prolapse has occurred. A certain routine should be followed in all these cases. After aseptic cloths have been spread over the abdomen the whole area is irrigated with a stream of hot normal saline solution (105° F.) flushed upon the protruded mass with some force so as to carry away all coarse particles. The protrusion is then gone over carefully with a sponge, and all recesses exposed so as to make sure that every portion has been cleansed. The omentum should be spread out upon a sterile towel and should be ligatured and removed if it is much soiled. The relation that the protruded part bears to the remainder of the omentum must be ascertained before this is done, as, if the central part only is protruded and is cut away, the lower end will be deprived of its blood-supply. The omentum should therefore be pulled well out of the wound and the protruded portion removed right down to its free edge.

The next step is to disinfect the abdominal wall around the wound, and, while this is being done, the protruded mass (which has already been cleansed) is covered with an abdominal cloth. The skin wound is then enlarged and, if necessary, that in the peritoneum also, so as to allow the prolapsed mass to be returned. The finger is slipped down beside the protruded mass and the opening is enlarged either with blunt-pointed scissors or a probe-pointed bistoury.

The peritoneum is now closed with a continuous suture, and after that the muscles and skin are united by through-and-through stitches. A drainage tube should be employed for a short time. If the prolapse has been grossly soiled and there is any doubt about the thorough cleansing of the protruded mass, it is as well to insert a drain into the abdomen in the immediate neighbourhood of the protrusion. A temporary stitch is passed through the abdominal wall at this point and is tied when the drain is removed. The after-treatment is the same as for exploratory laparotomy (see p. 209).

(b) **Treatment of long-standing prolapse.**—When the protrusion has lasted some time before the surgeon sees it, sepsis will certainly have occurred, there will be adhesions between the extruded structures and the wound,





to open it up, pull out fresh intestine and then to excise, re-unite, and put the bowel back would be very apt to be followed by septic peritonitis, whereas the patient usually makes a good recovery after simple removal of the strangulated bowel, and may be got into a good state for a subsequent plastic operation.

In some cases (though very rarely in civil practice) the omentum alone may have been protruded for several days before the patient comes under the surgeon's notice. Here the protruding portion will probably be granulating, and it is better to leave matters alone, merely applying antiseptic dressings. A laparotomy would be very likely to be followed by sepsis, whereas, if the omentum is left alone, it shrinks up and ultimately cicatrises. When this has occurred, the surgeon may excise the protruded portion and repair the defect in the abdominal wall with the object of preventing a ventral hernia.

### INFLAMMATORY AFFECTIONS.

Inflammation of the abdominal wall may be (a) superficial, (b) between the abdominal muscles, or (c) in the sub-peritoneal tissues.

(a) **Superficial inflammations** generally take the form of cellulitis and local suppurations of the abdominal wall, such as boils, which present no points of difference from superficial inflammations elsewhere.

(b) **Intermuscular suppuration** in the abdominal wall may follow contusions, punctured wounds or debilitating diseases such as typhoid fever, especially after spontaneous rupture of one of the muscles. These abscesses present no points of special interest.

(c) **Suppuration in the sub-peritoneal tissues.**—The most important of the inflammatory affections of the abdominal wall occurs beneath the muscles in the sub-peritoneal tissue. The most common seats of this inflammation are about the umbilicus, between the bladder and the pubes, in the epigastrium and in the lumbar region. It may occur in the course of general infective diseases, such as puerperal or typhoid fever, or it may be due to the presence of the pneumococcus. It may be connected with affections of the abdominal contents, such as injuries to the duodenum, or disease of the cæcum or the colon, the infection spreading from the intestinal canal to the cellular tissue around. It may also occur in connection with biliary calculi, in connection with the kidney or with disease of the spine or pelvis. Lastly, it may complicate bladder affections or be secondary to peri-uterine inflammation.

The abscess tends to spread rather towards the exterior than to the peritoneal cavity and is accompanied by extensive induration, which may persist long after the abscess has been opened. The pus is frequently foetid, but this is rarely from an actual communication with the intestinal canal; it is due to the presence of the *Bacillus coli communis* which has found its way from the intestinal canal.



abdomen. At the same time it is often impossible to be sure until an incision has been made. The treatment is the same as for similar tumours elsewhere.

#### SUB-PERITONEAL FATTY HERNIA.

Small fatty tumours which are formed by protrusion of the sub-peritoneal fat through openings in the abdominal fascia, are not uncommon about the linea alba above the umbilicus. These form small rounded, subcutaneous tumours, which are often intensely painful and require removal. They are sometimes really herniæ of the omentum or of an appendix epiploica and then cause severe dyspeptic symptoms which distinguish them from the true fatty tumours of which we are speaking.

**TREATMENT.**—The protruding fat should be removed and the hole in the fascia sewn up transversely. It is well to enlarge the hole and to free the fat for some distance around it, as it is not so much the protruded portion that causes the pain as the adhesion of the sub-peritoneal fat and possibly the peritoneum to the sides of the slit. The condition will be permanently cured if the slit is closed, and this is also a safeguard against a subsequent ventral hernia.

Among other tumours of the abdominal wall may be mentioned those which occur at the umbilicus in infants. Here a simple tumour of an adenomatous character belonging to the class of *teratomata* may arise about the time of the separation of the cord. *Myxomata* may also be met with in that situation, while, later on in life, *epitheliomata* are not uncommon. They should be removed when possible.

#### RETROPERITONEAL TUMOURS.

Retroperitoneal tumours may be divided into two great groups—namely, those lying behind the peritoneal cavity and those occurring in the mesentery. The latter are discussed in connection with the mesentery (see Chap. XXI.) ; but we may here refer briefly to the first form. These chiefly occur in the lumbar region and usually originate in the peri-renal fat. The majority are simple tumours belonging to the classes of lipomata, fibro-lipomata and fibromata. Sarcomata also occur in this region. The tumours may attain a very large size and extend from the diaphragm into the iliac fossa and across the middle line in front of the great vessels. Only the simple tumours are really amenable to surgical interference, but, as they are encapsuled, they may often be shelled out even when they are very large.

The diagnosis is by no means easy. The tumours are often mistaken for growths of the spleen, the kidney, or suprarenal capsule, or ovarian cysts. The important point is that the intestines (and especially the descending



## CHAPTER XIV.

### GENERAL REMARKS ON LAPAROTOMY : INTESTINAL SUTURE.

#### TREATMENT OF THE PATIENT BEFORE AND AFTER EXPLORATORY LAPAROTOMY.

THE preparation of the patient in cases of abdominal operations has reference only to operations for chronic disease ; in acute cases, no time can be wasted in preliminary measures. Practice varies very much as regards the amount of time and care devoted to the preparation of the patient before an abdominal operation ; some surgeons keep him in bed for several days in order to accustom him to the restraint and to teach him to lie in the dorsal position. Such a long time is not really essential, and nervous patients may be much upset when they are kept waiting for several days ; but it is helpful if the patient will give up the time to become used to the dorsal decubitus. In most cases a couple of days before the operation will suffice for the preparation of the patient ; and if possible, the day before the operation at any rate should be spent in bed. In all cases it is well to attend to the teeth, and if there is pyorrhœa alveolaris this should be treated by a dentist. It is well also to put the patient on a restricted and practically fluid diet for twenty-four hours previous to operation. Some advise that only boiled food should be given, and maintain that by cleaning the teeth and administering boiled food, the upper part of the alimentary canal can be rendered aseptic, especially if this treatment is continued for several days. It is very doubtful, however, if this is really the case, but certainly the patient will be more comfortable after an abdominal operation if the condition of the stomach and intestines has been attended to beforehand. The bowels must be thoroughly evacuated before the operation, and it is well to administer a purgative, preferably castor oil, two nights before the operation. Given at that time, the irritating effect of the purgative on the bowels will have completely



to marked distension of the bowel and also to headache and nausea or vomiting. Heroin (in doses of gr.  $\frac{1}{8}$ ) seems to do less harm than morphine, and when the pain is severe, it may be repeated in an hour or two. The arrangements as regards food and the action of the bowels depend to some extent on the conditions for which the operation has been performed; three of these may be mentioned:

1. Cases in which the alimentary canal has not been interfered with and the bowel has not been opened; for example, operations for gall-stones, for hernia, or on the pelvic organs.

2. When incisions have been made into the bowel or stomach, or portions of the alimentary canal have been removed.

3. When the operation is in connection with an acute inflammatory condition of the bowel.

In the first class of cases, the patient may be given small quantities of hot water as soon as the chloroform sickness has passed off, and later two ounces of milk and water may be administered every hour. This may be supplemented after a few hours with Benger's food, and albumen water, beef tea, or chicken broth with rusks may also be administered. As soon as the bowels have acted, soft solids are given, and in about a week the patient may be placed on ordinary diet. A purge should be administered on the day after the operation, and salines followed by an enema are the best. Some surgeons administer calomel in half-grain doses every hour until three or four grains have been taken, but calomel has often a depressing effect on the patient and is not so good as salines.

In the second class of cases it is important not to irritate the stomach or the bowel unnecessarily; but at the same time, if the operation has been properly performed, there ought to be no danger of leakage, and therefore fluids, especially hot water, may be given from the first. The diet must be more carefully attended to in these cases than in the former, any food being avoided which is likely to upset the stomach or the bowels, or to give rise to flatulence; in stomach cases care as regards the diet should be exercised for a considerable time, according to the morbid condition present.

When the small intestine has been the seat of operation, it is well to defer the administration of a purgative by the mouth for two or three days, so as not to set up any violent peristaltic action which might strain the stitches. In the case of the large intestine, the fæcal matter becomes hard if the action of the bowels is delayed too long, and may unduly stretch the seat of union, and therefore in these cases it is well to begin with frequent small doses of salines about the second day so as to render the contents of the bowel liquid. The best compound for the purpose is the ordinary hospital white mixture which may be administered in two-dram doses every two or three hours until about a couple of ounces have been taken. If no result follows at the end of twelve hours, a full dose (an ounce or more) may be administered. Teaspoonful





a gangrenous gall-bladder and a gangrenous appendix ; between various acute pelvic conditions, and so on ; all that can be done is to arrive at some approximate idea from the symptoms, as to the nature and seat of the trouble, so as to determine the sort of condition that has to be dealt with, and the most suitable place for the incision. This is discussed in connection with acute abdominal troubles ; here we shall only consider the chronic conditions for which an abdominal exploration may be advisable.

In chronic abdominal conditions, exploratory laparotomy is only one of various methods of diagnosis, and should only be undertaken after careful consideration. It should not be looked on as a trivial operation to be undertaken lightly and to replace other diagnostic methods ; on the other hand too much time must not be devoted to the latter methods, otherwise conditions, such as malignant disease, which might have been remedied had surgical intervention taken place at an early stage, may become inoperable owing to the unnecessary amount of time spent in medical investigation and treatment.

Exploratory laparotomy is not altogether a trivial operation, although no immediately serious result ought to follow the operation ; there are, nevertheless, some disadvantages associated with it. The occurrence of sepsis is one. Suppurative peritonitis should not of course occur, but milder forms of sepsis leading to adhesions is very common. The occurrence of adhesions is in most cases due to bacterial infection, which may be introduced by the hands or instruments or from the skin of the patient ; the infection is however mild, either because the bacteria introduced are but slightly virulent or because they are present in too small numbers. The bacteria may also come from the air ; in the case of a prolonged investigation, for example, dust must fall into the wound in varying amount, and although it does not usually contain pyogenic organisms—at any rate in sufficiently large numbers to cause suppuration—a certain amount of bacterial growth may occur, sufficient to cause the formation of peritoneal adhesions which may be a source of trouble to the patients afterwards. Extensive peritoneal adhesions are practically always the result of mild sepsis, but slight adhesions of the omentum to the line of incision may occur from portions of the omentum being caught between the peritoneal edges during the closure of the wound.

Besides the occurrence of adhesions, it is remarkable how much a simple laparotomy may upset a patient, and how long it may be before he regains his normal condition ; this is especially the case when he is below par. Laparotomy in malignant disease, when no remedial measure is found to be possible, has in many cases a distinctly deleterious effect and may hasten the end.

The practical conclusion is that in the first place obscure abdominal diseases should be recognised as being on the border-line of surgery and medicine, and that the best results will be obtained by the joint association

























## INTESTINAL SUTURE AND METHODS OF DEALING WITH WOUNDS OF VISCERA.

The surgical treatment of wounds of the stomach and intestine is by no means a modern subject, but has been considered at various periods in the history of surgery. No real progress was however made until it was pointed out by Joubert at the beginning of the last century that in order to obtain proper union, serous surface must be opposed to serous surface. His method, however, had the fault that the sutures were applied in such a manner that they penetrated all the coats. As a consequence, leakage of the contents of the intestine was very apt to occur along the track of the suture. A great advance was however made not very long afterwards by Lembert, who recognised the drawbacks of through-and-through sutures, and carried his stitches only through the serous and part of the muscular coats. Lembert's method of suturing still remains the basis of intestinal work and the plan now generally adopted in closing openings in the hollow viscera is to apply two layers of sutures, an innermost layer uniting the whole thickness of the walls, and an outer layer applied on Lembert's principle.

Operations on the alimentary canal have to be performed for various reasons, of which the following may be mentioned: To close simple incisions which have been made into the viscera for purposes of exploration of the interior, or in order to remove foreign bodies or tumours, such as polypi, which project into the interior; to close wounds inflicted accidentally or by other means than the surgeon's knife, ruptures, and so on; to close perforations; to enlarge the lumen of the canal; to unite portions of bowel which have been divided—for example, in the removal of a tumour of the intestines or of gangrenous intestine; or to form a union between different parts of the intestinal canal as in the operation of gastro-jejunostomy, or in anastomosis between various parts of the intestine. The exact details of the methods applicable for these different purposes will be given under the various headings. A few remarks may, however, be made on the methods of union in general, and especially on the union between different parts of the bowel.

What has already been said with regard to Lembert's sutures will suffice as regards cases in which an incision has been made into the lumen of the intestine. The cut edge is united by a continuous through-and-through suture, and this line of union is buried by a continuous Lembert's suture applied all around it, so as to invaginate and shut off the deeper layer of sutures. The sutures are applied in various ways, but the most convenient seems to be a running continuous stitch (see Fig. 86).

When portions of the intestine have been lost, and there is consequently some tension on the line of junction, it may be advisable to



of overcoming these objections, and these will be referred to in their proper place.

Another plan which has been a good deal used is to strip off the mucous membrane for a short distance from the distal of the divided ends, and then to push the other portion of the intestine into the interior and sew this cuff on to the portion of the intestine so introduced. With the view of preventing constriction of the intestine during suturing and also of facilitating the union, many artificial aids have been introduced of which we may specially mention Mayo Robson's bone bobbins. These enable the line of union to be quickly and accurately united without undue constriction of the canal.

Perhaps the apparatus which has attained the greatest popularity has been Murphy's metal buttons, which consist of two halves, one of which is introduced into each end of the bowel; the intestine is then drawn in by a circular suture over the stem of the button, and then the two halves are locked together and the wall of the bowel is approximated. There are many objections to Murphy's buttons, and their use has been generally abandoned. For instance, if the button has been badly applied, it may cause gangrene of the bowel and lead to perforation; it may become blocked by fæces; fistulæ may form; bleeding may occur; the button may be a long time in separating; it may remain *in situ* or it may pass upwards instead of downwards and require removal by a second operation.

We have already referred to some of the objections to end-to-end suture, and though a certain diminution in the calibre of the intestine may not be of great importance in the case of the small bowel, it may seriously interfere with the action of the large intestine. This to some extent is remedied by dividing the bowel obliquely so that the two surfaces which come into apposition have a larger diameter than if they were simply divided at right angles to the canal. Among other difficulties is the risk of non-union, especially at the junction of the mesenteric borders already referred to. With the view of strengthening the junction, omental grafts have been much recommended. These may be used in two ways. In the one a thin piece of omentum is entirely detached from the rest and is wrapped round the line of union; it generally retains its vitality and adheres to the line of union and thus forms an additional barrier against the escape of intestinal contents. In the other the piece of omentum is left attached at its base so as to have a certain amount of vascular supply. When the omentum is thin, however, the latter plan is not necessary, and it is objectionable, as it leads to an adhesion of the intestine to the omentum and may give rise to disagreeable symptoms.

Another difficulty in connection with end-to-end union is that the calibre of the two portions to be united may not be the same, and leakage may therefore occur. This is especially marked in the case of





that the peristaltic wave shall drive the contents of the upper part of the intestine in the same direction as in the lower ; this means that a loop must be formed in the upper part. If the coils of intestine are simply laid side by side the peristaltic wave will drive the contents up against the obstruction instead of downwards along the canal.



## THE SIGNIFICANCE OF PAIN AND VOMITING.

The presence of *pain* is of great importance, and its characters, situation, and mode of onset must be considered. Pain immediately following the ingestion of food is often indicative of ulcer of the stomach, and when the pain is referred to the particular spots mentioned on p. 256, it is very characteristic of ulcer and its situation. On the other hand, a diffuse pain of a neuralgic character may merely indicate some nervous affection. When the pain occurs some time after taking food, it is more suggestive of ulcer of the duodenum.

When vomiting is present, regard should be paid to its frequency, the character of the vomited matters, and the quantity brought up. For example, in dilatation of the stomach, vomiting may occur at infrequent intervals—sometimes only every second or third day when the stomach is much dilated—and the quantity brought up is proportionately large. On the other hand, in simple ulcer of the stomach vomiting often occurs soon after food, and the pain is relieved by it. Again, vomiting due to intestinal obstruction bears no distinct relation to food and is often accompanied by persistent retching. The smell of the vomited matters may be characteristic ; for instance, in dilatation of the stomach the vomit usually has a yeasty odour, whereas in cancer the material vomited is generally foul, and in intestinal obstruction it soon becomes fæcal. The presence of blood in the vomit may be strongly indicative of the true nature of the case. Profuse hæmorrhage generally implies a simple ulcer. The frequent and constant admixture of a little blood with the vomited matters, especially if these smell badly, usually points to cancer of the stomach ; in ulcer of the duodenum, blood in the vomited matter is less common and more usually appears in the stools as melæna ; when it occurs in the stomach contents it is often in the form of ‘ occult blood ’ (see p. 235). Profuse hæmatemesis also occurs in cirrhosis of the liver, but here the blood is usually very dark in colour, the bleeding being venous.

## INSPECTION OF THE ABDOMEN.

Mere inspection of the abdomen rarely gives much information as to the condition of the stomach. In thin patients, suffering from pyloric obstruction, either congenital or acquired, however, it may be possible to observe peristaltic movements of the stomach immediately after taking food. In cancer of the pylorus the tumour may sometimes be large enough to be evident, or the greatly dilated stomach may be seen through the abdominal wall. When there is an ‘ hour-glass contraction ’ of the stomach accompanied by flatulent distension, the outline of the organ may be seen through the abdominal parietes and the true nature of the condition may be suspected. In acute dilatation of the stomach the character and degree of the dilatation is often very characteristic.



skin—should be avoided, otherwise contractions of the abdominal muscles may be set up and the object of the examination defeated. Palpation should always be undertaken without anæsthesia in the first instance in order to determine the question of pain, but when the abdominal walls are rigid or the patient is stout, or when there is much pain, it may be necessary to administer an anæsthetic before completing the examination, so as to obtain satisfactory relaxation.

Before concluding the examination by palpation, the patient should be turned first upon one side and then upon the other, and, when the examination is not under anæsthesia and there is no risk in the procedure, he may finally rest upon the hands and knees so as to allow the stomach to fall forward.

In this way tumours may be felt in the stomach walls or about the pylorus, and their size, consistence, and mobility noted. Powerful peristaltic movements passing from left to right, such as occur when there is obstruction to the pylorus, may also be appreciated. Succussion may be elicited in cases of dilatation of the stomach, and the undue sensibility of the organ so frequently associated with gastric ulcer may be very evident.

#### PERCUSSION AND AUSCULTATION.

These methods are useful when employed in addition to others, but are not to be relied upon by themselves. The note elicited by percussion of the stomach, although fairly characteristic, is not absolutely reliable. Percussion is most valuable when it is combined with inflation (*vide supra*). Auscultation is chiefly of value in cases of hour-glass contraction, when the characteristic rushing noise due to the passage of contents from one portion of the stomach to the other through the narrow communication may be heard. In order to make out the limits of the stomach when it is not much dilated, the patient may be made to stand up and the limits of the stomach ascertained by percussion as far as possible. If now the supposed area of the stomach be marked out on the skin with an aniline pencil, its accuracy can be more or less checked by making the patient drink a pint or more of fluid and again percussing the stomach; this will then give a dull area corresponding to the greater curvature. The chief difficulty is the resonance of the transverse colon, the percussion note of which may be mistaken for that of the stomach. It has been proposed to get rid of this fallacy by means of a large water enema introduced into the rectum so as to distend the descending and transverse colon, but the method is not accurate enough to allow any reliable conclusions to be drawn from it.



does not mix with the stomach-contents, and contains nothing which will complicate the subsequent chemical analysis. If oil or glycerine are used, they should be tested with litmus paper, and any that is strongly acid must be discarded. As a rule there is no difficulty in withdrawing the contents of the stomach when once the tube has been passed, the retching which this procedure usually induces in those not familiar with its passage being sufficient to expel the partially digested material. If this is not the case, the patient should be made to lie face downward with the end of the tube on the floor: the escape of the fluid may also be assisted by 'milking' the free end of the tube between the finger and thumb. In no case must water be added to start the flow, as, even if a measured amount is used, this would complicate the chemical analysis to such an extent as to render it quite untrustworthy. After as much as possible of the undiluted stomach contents have been removed, it is advisable to wash out the stomach with warm water, collecting the washings. A comparison of the total acidity of these with that of the undiluted contents will allow the total volume of the material in the stomach to be calculated with some accuracy.

In health this volume should be from  $1\frac{1}{2}$  to 2 ounces, and any decided increase beyond the latter figure indicates some degree of dilatation. When this condition is severe the amount removed after an hour's digestion may be almost or quite as great as the amount taken. In such cases *sarcinæ* will usually be present in considerable numbers.

The examination of the material removed must be both microscopical and chemical. The material should be filtered, and the former examination carried out on the material which remains on the filter-paper, the filtrate being reserved for the chemical analysis.

*Microscopical examination.*—A small amount of the solid residue should be examined wet, between slide and cover-glass. The bulk of the material present will be found to consist of partially digested food (mainly starch). In health, but few organisms are seen; the amount of hydrochloric acid present in normal gastric juice being sufficient to inhibit growth. *Sarcinæ* are characteristic of dilatation of the stomach, in which condition they occur in large numbers. They are readily recognised in unstained preparations as refractile masses consisting of agglomerations of cocci pressed together so as to have a roughly cuboidal shape: the old comparison of the resulting mass to a bale of wool is a good one. *Sarcinæ* are rarely found in large numbers in carcinoma of the stomach. Yeasts are frequently found in a variety of diseases, and appear to be able to grow in a larger percentage of hydrochloric acid than can most other micro-organisms. The Boas-Oppler bacillus is a form of lactic acid bacillus which is frequently found in cancer of the stomach, and is comparatively rare in other conditions: its presence in large numbers has, therefore, a considerable amount of diagnostic value. It is a rather large bacillus with parallel sides, and is grouped in long chains, the





drops are evaporated to dryness on a porcelain dish by gentle heat, a drop of the filtrate added, and the dish again warmed; care must be taken to avoid charring. A rose-red colour is given when free inorganic acids are present.

The simplest way to proceed is as follows: Take 10 c.c. of the filtrate and add a couple of drops of a 1 per cent. alcoholic solution of phenolphthalein. This is the indicator for the determination of the total acidity; it is colourless in presence of acids, whether organic or mineral; pink in alkaline solutions. Add also a few drops of the solution of dimethylamidoazobenzol. If free, or physiologically free hydrochloric acid be present, the solution will turn pink. Now run in decinormal caustic soda from a burette until this pink colour is just discharged. Note the amount: it indicates the amount of standard solution necessary to neutralise the active hydrochloric acid. Continue the addition until the solution again becomes pink; the amount of soda solution will give the total acidity. Instead of adding the dimethylamidoazobenzol to the fluid, I prefer to remove a drop of the latter after each addition of standard soda, and test it by mixing it with a drop of the indicator on a porcelain slab. When a pink colour is no longer given the active hydrochloric acid is neutralised.

The calculation is simple. Each cubic centimetre of the decinormal soda solution contains 0.004 NaOH and is neutralised by 0.00365 HCl. Then if we took 10 c.c. of the filtrate and added 3 c.c. of decinormal soda before the disappearance of the pink colour with dimethylamidoazobenzol, the percentage of active acid was  $3 \times 0.00365 \times 10$ , or 0.1095 per cent. If the total amount added before the phenolphthalein turned pink was 4.5 the total acidity was  $4.5 \times 0.00365 \times 10$ , or 0.16425 per cent. The difference (0.05475) indicates organic acids and acid salts; the latter are practically constant if the same test-meal is given, and a large difference between the free and the total acidity indicates the presence of organic acids, which must now be sought for. The presence of organic acids may be demonstrated by the use of Congo red paper, which turns blackish-blue, the colour disappearing when the paper is warmed over a spirit lamp, whereas that due to hydrochloric acid remains.

The only important organic acid met with after a test-meal is lactic; when present in large amount it indicates that much fermentation is going on, and is presumptive evidence in favour of carcinoma. It is rarely if ever present in large amount, when more than a trace of free hydrochloric acid is present, and it is unnecessary to search for it in these conditions; a minute amount may be derived from the bread taken, and much larger quantities may occur if milk or butter has been ingested. The best test is Uffelmann's. To half a test-tube of 1 in 40 carbolic acid add one drop of liquor ferri perchloridi; to the deep violet solution thus obtained add the solution to be tested. Lactic acid gives a fine canary-



a syringe. A soft, red rubber œsophageal tube (known as Jaques') about thirty inches long is connected by an inch of glass tubing with a length of india-rubber tubing, at the other end of which is a glass funnel capable of holding from half a pint to a pint. The tube—which should have both a lateral and a terminal opening, so that if one gets blocked the other may act—is passed in the same manner as an œsophageal bougie (see p. 174), being assisted by swallowing efforts on the part of the patient. When it is in position, the patient's head is bent well forwards or turned to one side so as to allow the saliva to flow out of the mouth, and the funnel is held at or below the level of the stomach.

As a rule the gastric contents begin to run into the funnel immediately the end of the tube passes into the stomach, and may be collected for analysis. If the fluid does not run immediately, the funnel should be lowered well below the level of the stomach and the patient asked to cough or strain. Should this manœuvre fail, it is only necessary to fill the funnel with a little warm water and to raise it above the level of the mouth; when some of the contents of the tube have thus been made to enter the stomach, the funnel is lowered and the fluid syphoned off. As much of the gastric contents as possible is run off first and then the irrigation is proceeded with. The funnel is filled with either saline solution or boiled water at the body temperature, and by raising it to the level of the mouth when the patient is in the sitting position or slightly higher when he is recumbent, this is allowed to enter the stomach gradually. Before the funnel is quite empty, it is again lowered below the level of the stomach and as much fluid as will run away is withdrawn. This process is repeated several times until the fluid returns quite clear, and is a better plan than that of first filling the stomach with a large quantity of fluid and then allowing it all to run away. If one funnel-full at a time is introduced and withdrawn there is no risk of over-distending the stomach, and the procedure is painless.

There are no real difficulties or dangers attaching to this method. It should not however be carried out in bad heart-disease or great cachexia from constitutional mischief, as the nervous disturbance caused by it might be prejudicial. It should not be used in cases of gastric ulcer or gastric cancer with active bleeding. In other cases, however, both of ulcer and cancer, it is unobjectionable.

Gastric lavage is also employed as a method of treatment, and this will be referred to again; it is not curative, but it renders the patient much more comfortable by withdrawing fermenting contents from a stomach that is unable to pass them on, and thus diminishes the distension. It is also an exceedingly valuable preliminary to abdominal operations.

**Transillumination** of the stomach has also been employed, a sound bearing a powerful electric lamp at its end being passed into the viscus, which may or may not be artificially distended (see p. 229). The object of the procedure is to give a view of any shadow produced by growths or



condition is one in which there is a probability that the exploration will lead to the immediate adoption of some remedial treatment ; if there is any uncertainty as to the feasibility of remedial measures, the surgeon must feel confident that the procedure will not be dangerous in itself.

Typical examples of the utility of exploratory operations are the following : When there is a tumour in the neighbourhood of the pylorus which is freely movable and accompanied by symptoms of dilated stomach, an early exploration should be carried out, because the enlargement may be inflammatory, and an exploratory operation will enable the surgeon to proceed to pylorotomy or gastro-jejunostomy which will probably cure the patient. Should the swelling turn out to be a malignant tumour, the exploration will show whether excision of the pylorus is advisable and, if not, the patient's condition may be improved by a gastro-jejunostomy. Again, exploration is often of benefit in obstinate cases of pain and dyspeptic symptoms, as it may reveal the presence of adhesions or bands, or of trouble in some other organ, such as the appendix or the gall-bladder, the removal of which will relieve the symptoms. Or again, it may reveal the presence of an ulcer or cicatricial contraction as the result of an ulcer, and these adhesions and contractions may be suitably treated. On the other hand, to perform an exploratory operation on a patient who evidently has extensive cancer of the stomach, and on whom there is very little chance of performing gastro-jejunostomy and relieving the symptoms, or on one who is obviously not in a fit condition for any severe operation, such as excision of the pylorus, is merely satisfying idle curiosity. At the present day there is too great a tendency to the employment of an exploratory laparotomy to the exclusion of other methods of diagnosis.

It has happened somewhat unfortunately that large irremovable tumours have been met with when the abdomen has been opened, and improvement, or even apparently a complete cure, has followed the operation. This has undoubtedly given a fillip to exploratory laparotomy even in hopeless cases, under the impression that the tumour might disappear as a result of the laparotomy. It is probable that these tumours are not malignant. We know that in the case of the stomach, an extensive fibromatosis of the organ is not infrequently met with (see p. 253) which is indistinguishable, macroscopically, from carcinoma. To cut into an abdomen containing a typical cancerous tumour on the chance of the laparotomy leading to the disappearance of the tumour is a practice that cannot be too strongly deprecated. But whenever the symptoms point to some condition that is remediable, or when there is doubt as to the applicability of several methods of treatment, an exact diagnosis is imperative and an exploratory laparotomy should be done. No exploration should be practised, however, even in these cases, unless the surgeon is prepared to carry out forthwith any method of treatment that seems most suitable.



viscus is uninjured, and which vary from a simple contusion to partial rupture of the coats of the stomach ; these are usually accompanied by non-perforating injuries of the abdominal wall, such as simple contusions, but occasionally a non-perforating wound of the stomach may occur in connection with a perforating one of the abdominal wall when the injury is done with a blunt instrument, the chief force being expended in driving the instrument through the muscles.

2. *Perforating wounds*, in which the interior of the stomach communicates with the general peritoneal cavity ; these again may be subdivided into (a) injuries accompanied by perforating wounds of the abdominal wall and (b) those occurring independently of this condition. The injuries are not necessarily limited to the stomach itself ; in gunshot or sword wounds, for instance, the pancreas, liver, or spleen is frequently injured at the same time.

**Symptoms of non-perforating injuries of the stomach and abdominal wall.**—It is often extremely difficult to separate the symptoms due to the injury to the abdominal wall from those due to the injury to the stomach. Hæmatemesis and melæna may be present, but they do not indicate the exact nature of the lesion in the stomach. When the patient receives a blow in the region of the stomach there is great shock from the blow on the solar plexus, and if this is prolonged and the pain becomes more intense and the vomiting persists, a severe contusion of the stomach is probable. These symptoms will pass off in the course of three or four days unless the injury is so severe as to lead to local gangrene, when they will persist and will be followed at the end of a week or ten days by those of sudden perforation or of a spreading peritonitis.

**Symptoms of perforating wounds of the stomach unaccompanied by a perforating wound of the abdominal wall.**—In some of these cases the diagnosis is simple, in others it is extremely difficult. Should there be free communication between the stomach and the abdominal cavity, gas will find its way into the peritoneum ; this very important symptom shows itself by distinct decrease of the liver dullness, although the abdomen is not distended. There is also extreme collapse, a rapid pulse, a peculiarly anxious countenance, and rigidity of the abdominal muscles. The temperature is subnormal, the breathing is entirely thoracic, and the skin is cold ; there is frequently hæmatemesis.

When, however, the rupture of the stomach is small, is situated on the posterior surface, or takes place during fasting, the symptoms may be slight until acute peritonitis sets in. An important help in arriving at a correct estimation of the state of affairs is the condition of the stomach at the time of injury ; suspicion of rupture will be aroused if the accident has occurred after a full meal, and especially if there is also blood-stained vomiting, marked thoracic breathing, and an amount of collapse out of





the epigastrium ; the first part of the duodenum, the pancreas, the liver, the gall-bladder, or the spleen, may suffer, and the surgeon's attention should not be directed solely to the condition of the stomach.

**2. Of rupture of the stomach without perforation of the abdominal wall.**—An exploratory laparotomy should be done immediately in all cases of contusion of the abdomen in which the symptoms appear to point to rupture of the stomach, and after a few hours in cases in which a contusion of the abdominal wall is accompanied by doubtful symptoms of stomach injury which steadily increase in severity. If the collapse in the latter cases shows no signs of improvement under treatment in the course of two or three hours, while the abdominal rigidity increases—and in any case in which there are signs of gas free in the abdomen—no further delay is permissible and the abdomen should be opened in the middle line ; even if no injury is found, the patient will be little the worse for the exploration, while it may be the means of saving life if the stomach has been ruptured.



FIG. 88.—METHOD OF APPLYING AN ICE-BAG. A large flat ice-bag is slung from a cradle and rests upon a double fold of lint placed next the skin.

Should no perforation of the stomach be found and should there be no intraperitoneal hæmorrhage or rupture of the liver or spleen, the duodenum should be examined before the abdominal wound is closed. The condition of the posterior wall of the stomach should always be ascertained as well as that of the anterior, as injuries may occur in this situation from severe blows on the epigastrium without any wound of the anterior wall.

**Operation.**—The most energetic *measures must be taken against shock*, and rapidity of operation and a warm room are especially important.

*The incision* should be a vertical one, about an inch to the left of the middle line, reaching from the xiphoid cartilage to the umbilicus. As a rule, blood and gas will be apparent immediately the peritoneum is opened if the stomach has been ruptured. If a rupture is found, the treatment has two main objects—the first, to prevent further extravasation and to repair the rent in the wall of the stomach, and the second, to remove the extravasated contents from the abdominal cavity. As a rule it is best to begin with the repair of the wound in the stomach wall.







carried away. The chief of these recesses are the space between the stomach and the liver, the flank on either side, and Douglas's pouch, as in these directions the more solid particles will gravitate and lodge. The irrigation should be continued until the fluid runs out clear. The assistant then lets go the edges of the incision and the bulk of the fluid escapes from the abdomen.

(3) *Should there be very extensive rupture of the stomach so that the whole of the peritoneal cavity is soiled, and should the extravasated material contain coarse particles of food which are widely distributed over the peritoneal cavity,* it will be necessary to carry out the cleansing of the abdomen more thoroughly. For this purpose the abdominal incision must be enlarged, so that it reaches almost from the xiphoid cartilage to the pubes, and the intestines must be turned out of the abdominal cavity on to hot cloths spread on the abdomen to receive them. This empties the abdominal cavity, which can then be mopped up and flushed out extremely rapidly, Douglas's pouch and the lumbar region being thus rendered perfectly accessible. The coils of intestine should then be spread out upon the cloths on the front of the abdomen and examined coil by coil as quickly as possible, being flushed with hot normal saline solution (105° F.) under fair pressure from the nozzle of an irrigator as this is done. All foreign material is thus removed and solid particles are caught upon the abdominal cloths as they are washed off the intestines and are thus not likely to infect other portions of the peritoneum. The whole operation of *evisceration* must be done rapidly, and it is well at the same time to inject saline solution into each axilla unless the intravenous method of inducing anæsthesia (see p. 32) is being used. If the surgeon is alarmed at the severity of the collapse previous to the operation and hurries unduly over the cleansing of the abdomen or performs it in a perfunctory manner, he will lose patients who might otherwise be saved by a more thorough and deliberate procedure. There can be no doubt that this method of evisceration adds to the shock ; but against this must be placed the facts that these patients are otherwise certain to die of peritonitis in a day or two and that this method offers them practically the only chance.

We do not wish to imply that evisceration should be practised in all cases of widespread infection of the general peritoneal cavity. When the material in the peritoneal cavity is fluid and does not contain large solid lumps and masses, the procedures already detailed (*vide supra*) will probably do all that is required and certainly with less shock. When, however, solid masses of potato, meat, or other material, are widely distributed over the abdomen and are not likely to escape with the fluid employed for flushing, the more thorough method of cleansing by evisceration must be employed.

*Closure of the abdominal wound.*—The abdomen is closed in the usual way, through-and-through stitches and not buried ones being employed (see p. 219) ; but before doing this, the question will arise as to whether



to those applying to the cases unaccompanied by a wound of the abdominal wall, and if it is considered to be necessary it should be effected in a similar manner (*vide supra*).

In the case of gunshot injuries of the abdomen in military practice it may be well to avoid operation in many cases on account of the difficulties of carrying out asepsis, but in civil practice we do not think that the old rule demanding immediate operation for all cases of suspected injury to the viscus should be departed from; the patient can be attended to at once, and everything that is needful will be at hand.

*After-treatment.*—An enema containing hot coffee (2 ozs.); brandy (1 oz.), beef-tea (1 oz.), and liquor strychninæ (℥x), and an injection of morphine (gr.  $\frac{1}{3}$ ) may be given as soon as the patient is put back to bed if the shock is severe. Subcutaneous saline infusions will be required under similar circumstances, or continuous rectal proctoclysis in the less severe cases (see Vol. I. p. 115). This helps to alleviate the intense thirst from which these patients often suffer.

There is no reason to abstain from feeding the patient by the mouth as soon as the anæsthetic vomiting has ceased. The food must be fluid at first, but in a very short time semi-solids may be given, and the patient may be allowed solid food in about a week.

These patients should always be placed in the 'Fowler position' after the operation—that is to say, they should be propped almost bolt upright in bed so that all fluids may gravitate downwards to the pelvis, and the diaphragm may not be hampered. Fig. 91 shows how this position can be efficiently maintained without fatigue to the patient. In most cases they can be placed in this position at once, but if the shock is severe, the recumbent position may be necessary for some hours.

Morphine may be required for pain or restlessness during the first few days, but it should not be employed unless it is distinctly indicated, as it disorders the digestion and may cause much trouble with the bowels. For mere restlessness, as apart from pain, such drugs as aspirin (gr. x), the bromides of ammonium and potassium, and chloral hydrate are more suitable. The regulation of the bowels must be carefully attended to. It is of the first importance that flatulent distension should be avoided. After the first twenty-four hours calomel, in doses of one-quarter grain, may be administered every hour until an action has resulted or five grains have been taken. In other cases a dram of phosphate of soda every three hours acts better. The subsequent regular evacuation may be ensured by doses of cascara evacuant, infusion of senna-pods, or other mild aperients; later, liquid paraffin (℥ss.) may be given night and morning.

When the abdominal wound has been closed without drainage, no belt is required, and the patient may be allowed to get up at the end of about three weeks wearing a firm abdominal bandage, which should be





in women also, especially in lunatics or extremely hysterical subjects, balls of hair, sometimes of enormous size, may form in the stomach as the result of the practice of constantly biting the ends of the hair. When a large body reaches the stomach, its escape may be difficult on account of its size or its shape. Bodies with sharp points which penetrate the stomach walls and may cause ulceration and perforation are particularly dangerous.

The presence of a foreign body of this kind is usually easily recognised. In the first place the history of the case is often quite clear ; no mistake can well be made when the patient swallows a toothplate, or a public performer swallows a knife, while the history is also usually clear in the case of lunatics. In addition to this, there are the local symptoms, such as constant pain and tenderness on palpation, and sometimes there is a swelling to be felt in the stomach ; in a large number of cases the X-rays will determine the existence of a foreign body and its situation.

**TREATMENT.**—(a) **Of small smooth bodies.**—For small foreign bodies, such as those usually swallowed by children, all that is necessary is to facilitate their passage along the alimentary canal. For this purpose it has long been the custom to administer tenacious substances, such as porridge, thick rice-pudding, or figs, with the object of filling up any crevices in the foreign body, and so converting it into a smooth object which can pass along the alimentary canal with the least possible amount of irritation.

(b) **Of large bodies.**—When the body is too large to pass through the pylorus, it will give rise to much distress, and if it should possess sharp points or edges, there is serious risk of ulceration and perforation ; its removal is therefore urgently called for.

*Gastrotomy.*—If performed as soon as it is evident that the foreign body will not pass safely along the alimentary canal, gastrotomy is very simple and safe, whereas the risk is considerable if it is delayed until the foreign body has set up inflammatory changes in the stomach wall. An incision should be made a little to the left of the middle line, commencing on a level with the tip of the xiphoid cartilage and running vertically downwards for about four inches. The method of opening the abdomen has already been described (see p. 215). If the stomach does not present at once on incising the peritoneum and separating the edges of the abdominal wound, it will be necessary to push down the great omentum and the transverse colon, when the stomach will come into view, and there will be no difficulty in making out the position of the foreign body ; the portion of the stomach containing it should be pulled out of the wound and packed off with abdominal cloths.

The next step is to open the stomach, and the best situation for this incision is on the anterior surface about midway between and parallel to the two curvatures ; here the vessels are smallest and there is consequently less bleeding, whilst the incision lies on the surface of the exposed



## CHAPTER XVII.

### GASTRIC ULCER.

SIMPLE ulcer of the stomach occurs much more frequently in women than in men. The usual age of those suffering from it is between twenty and forty in women, while in men the average is ten years later ; it may, however, occur up to an advanced period of life. The ulcer is most common upon the posterior wall and lesser curvature of the stomach near the pyloric end. It is said that in not more than 5 per cent. of all the cases is the ulcer situated upon the anterior wall, but on the other hand, something like 80 per cent. of all the fatal perforations following ulcer occur in that situation. As a rule the ulcer is single ; it is rare for more than two to coexist, and sometimes an ulcer occurs in the duodenum as well as in the stomach. The ulcer itself is usually round or oval, but it may be irregular in outline, either from extension of the original ulcer or from the confluence of isolated ones. The edges are quite clean-cut, and the ulceration may only involve the superficial portion of the mucous membrane, or the submucous and muscular coats may be entirely destroyed. There is no constant relation between the depth of the ulcer and its size ; a small ulcer may penetrate deeply, and *vice versâ*. When the ulcer is of recent development, the stomach walls in its immediate vicinity are not much altered ; when, however, it has lasted for a long time, there may be extensive induration, giving rise to characters often mistaken for malignant growth—the so-called ‘leather-bottle stomach’ (see p. 253). The rest of the stomach is usually normal except that the pylorus is unduly contracted.

We may also refer to those cases in which hæmatemesis occurs, but in which the mucous membrane when examined during life, shows no definite ulcer ; in these the blood appears to ooze continuously and in large quantities from minute erosions or abraded surfaces scattered over the mucous membrane of the stomach or gathered together into groups. In other cases very minute, almost pin-point ulcers are present extending deeply, and exposing the small submucous arteries ; these two causes



of the stomach are interfered with or not. When the ulcer is situated near the pyloric orifice and is of any considerable size, the contraction during healing narrows the pylorus and interferes with the passage of food through it; this stenosis may progress to such an extent as to obliterate the pylorus almost completely. The stomach in consequence becomes dilated, and the symptoms of a dilated stomach are present in addition to those of gastric ulcer.

Dilatation of the stomach is a frequent accompaniment of gastric ulcer at some period of its course. In the slight cases this dilatation may arise from the spasm of the pylorus, which commonly accompanies a gastric ulcer. It is usually due, however, to cicatricial narrowing following upon the contraction of an ulcer in the vicinity of the pylorus, or to perigastric adhesions. The dilatation of the stomach in such circumstances is a result of obstruction to the passage of food.

As the ulcer deepens, the peritoneal coat covering its base becomes inflamed, and adhesions may occur between the stomach and other parts, and interfere with the functions of the organ by their contraction. This perigastritis is frequent in ulcers that have extended deeply into the coats of the stomach, and is of great importance, partly because it interferes with the movements of the organ and partly because it may act beneficially in affording some protection against perforation.

The exact effects of perigastritis will depend upon the situation of the ulcer; thus, when the latter is situated in close proximity to some other organ adhesion will occur, whilst, if it be on the anterior surface, cicatricial bands are likely to form. Adhesions are most frequent when the ulcer is at the pylorus, which may then become attached to the under surface of the liver, the gall-bladder, or the bile duct, and may become so distorted that the passage of the gastric contents through it is greatly interfered with. Similarly, an ulcer on the posterior surface causes the stomach to become adherent to the pancreas. Adhesions may also occur with the omentum, the transverse colon, or the diaphragm; they are not so common when the ulcer is on the anterior surface, and this explains the fact that an ulcer in that situation is the most common cause of fatal perforation.

The perigastritis occurring in connection with extensive ulcers on the anterior surface of the stomach may cause much distortion as healing occurs from contraction of the inflammatory material upon the peritoneal surface. This may give rise to a constriction passing from the upper border of the stomach to the lower and producing the so-called '*hour-glass contraction*'; the stomach is divided into two cavities with a passage of varying calibre between them. As a result, the cardiac portion of the stomach may become dilated to such an extent that the condition may not be diagnosed, the case appearing to be one of contraction of the pylorus rather than an hour-glass contraction of the stomach. Some authors limit the term hour-glass contraction to its strict meaning—namely, a



of the ulcer may be obtained by noticing the position of greatest ease ; for example, if the dorsal position is the most comfortable, the probability is that the ulcer is situated on the anterior wall of the stomach ; if lying on the right side gives most ease, it is probable that the ulcer is near the cardiac end and *vice versâ*. The pain is in the middle line, and when the ulcer is near the cardiac end of the stomach it is generally complained of in the upper part of the epigastrium ; when it is at the centre of the viscus, it is near the middle, and when at the pyloric end, at the lower part of the same region. When the ulcer is on the anterior wall, there is marked tenderness in the epigastrium ; when on the posterior surface, the tender spot is to the left of the last dorsal spine.

*Vomiting* commonly occurs at some period in the course of a gastric ulcer, but its diagnostic importance is comparatively slight as it occurs so frequently in many other affections. If present it generally sets in some considerable time after food. It is invariably present when an ulcer in the region of the pylorus has cicatrised and the stomach has undergone dilatation, and then large quantities of food in a state of decomposition and undergoing yeasty fermentation are vomited at irregular and infrequent intervals.

*Bleeding* is the most certain sign of ulcer of the stomach, but it may be entirely absent, and even its presence is not certain evidence of the presence of a visible ulcer (see p. 252). When it is slight it is dangerous, more from the anæmia produced by the constant recurrence of the bleeding than from the actual loss of blood at any given time. In other cases the hæmorrhage is very grave and the patient may actually die from loss of blood, although this is very rare. Hæmorrhage from the stomach may occur in malignant disease and in other conditions such as cirrhosis of the liver, but the occurrence of occasional attacks of hæmorrhage from the stomach accompanied by pain and vomiting in a young chlorotic woman is almost pathognomonic of a gastric ulcer.

*Hyper-acidity of the gastric contents* due to an excess of free hydrochloric acid, is an almost constant feature in the acute stages of the affection, but is not diagnostic in itself and is not invariably present.

**TREATMENT.**—In the early stages, the treatment is essentially a matter for the physician, but when the disease is established surgical measures are being adopted in an increasing number of cases and often with the greatest benefit. We may summarise the chief circumstances under which the surgeon may be called in :—

1. When the symptoms are long-continued and do not yield to medical treatment, and particularly when profound anæmia is resulting from the repeated hæmorrhages.

2. To arrest hæmorrhage that threatens life.

3. When perforation has occurred.

4. To treat a sub-phrenic abscess.

5. To relieve constriction of the pylorus or an hour-glass contraction.





Before beginning rectal feeding the lower bowel should be emptied and cleansed by the administration of a copious warm-water injection ; at least an hour must then elapse before the nutrient enema is introduced.

The best position for the patient is lying on the left side with the pelvis slightly raised on a pillow placed under the hips. A long soft rubber œsophageal tube is greased (glycerine must not be used) and carefully passed from six to twelve inches into the bowel ; to the end of the tube a glass funnel is attached, and into it the enema (warmed to 99° F.) is poured. For the first ten minutes after the introduction of the enema the nates should be pressed together with a towel, and the patient ought to remain undisturbed for an hour.

The pressure under which the fluid is introduced should not exceed that due to a column of water two feet high ; the fluid, flowing in slowly, finds its way into the sigmoid flexure and the descending colon, and therefore does not excite the desire to evacuate. This avoidable complication is often due to a sudden distension of the rectum which usually occurs if the injection be shot into the bowel with a syringe.

The volume and exact composition of the enema must depend upon the state of the mucous membrane of the large intestine. It is generally desirable to introduce at least two and a half ounces (80 grms.) of proteid, three and a half ounces (100 grms.) of carbohydrate, and five drams (20 grms.) of fat per diem. This, if 50 per cent. were absorbed, would represent a quarter of the energy required by a patient lying in bed in a room at 62° F.

The constituents of the enema must be unirritating and easily absorbed ; the following have been used with success and are usually retained without trouble :—

|                |      |                           |       |                   |      |
|----------------|------|---------------------------|-------|-------------------|------|
| Glucose . . .  | ℥vj. | Albumose <sup>1</sup> . . | ℥ij.  | Ox serum . . .    | ℥v.  |
| Milk . . .     | ℥iv. | Milk . . .                | ℥vij. | Milk . . .        | ℥ij. |
| Starch (raw) . | ℥j.  |                           |       | Glucose or Starch | ℥vj. |
| Salt . . .     | ℥ss. |                           |       |                   |      |
| Sextis horis.  |      | Sextis horis.             |       | Sextis horis.     |      |

Occasionally it is found that the addition of a few minims of liquor pancreaticus improves absorption, but this preparation must not be added to an enema containing more than 10 per cent. of starch, lest the mucous membrane be irritated by the strong solution of sugar which would be rapidly formed. The proteids in eggs and milk are not so readily absorbed as those in serum, but the latter has been known on rare occasions to give rise to slight urticaria. The prolonged administration of albumose may lead to colitis.

Nutrient enemata must not be stopped if the first few be returned ; a tolerance is often established after two or three have been given. If, however, tolerance be not established, an ounce of red wine added to the enema has frequently been found to produce the desired result.

If no formula proves satisfactory, even when only three ounces are introduced at a time, recourse must be had to a small boiled starch enema (1 oz.) containing ten to twenty minims of tincture of opium followed an hour later by a nutrient injection.

The rectum must be washed out daily with an enema of warm normal saline. Nutrient suppositories cannot be recommended, for, even if they were absorbed, more than sixty would be required daily to supply the necessary energy.

The absorption of fat is found to be so variable a factor in different individuals that it is often wise to adopt a supplementary method of administering it when prolonged abstinence from oral feeding is indicated. An ounce or two of sterile olive oil may be injected into the subcutaneous tissue of the groin every second day. No untoward effects follow this procedure, whilst the fat thus introduced is slowly utilised and may materially diminish the fall in the weight of the patient.

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<sup>1</sup> Witte's peptone.



*Advantages of the different methods.*—Both the anterior and posterior operations are suitable in certain cases. The *anterior operation* is the easier and involves less disturbance of the parts than the posterior. It is especially suitable for cases in which the ulcer is extensive and situated on the posterior wall and the stomach is bound down to the pancreas or other surrounding structures. It may also be employed when the patient is very ill and it is of importance to disturb the parts as little as possible. Further, when an ulcer has been excised from the anterior surface of the stomach, it may be advisable in some cases to utilise the opening so formed for the purpose of a gastro-jejunostomy, and in that case the anterior operation is performed. The chief objections urged against the anterior operation are that kinking is apt to occur at the junction with the stomach, that if the colon becomes distended or if much

fat is deposited in the omentum, the limbs of the small intestine may be unduly compressed or *vice versa* that the small intestine may compress the colon, that hernia may occur under the loop of small intestine, and that 'peptic ulcer' of the jejunum is more apt to occur after it than after the posterior form. The first two conditions may give rise to regurgitant vomiting or the formation of the 'vicious circle'; and with the view of avoiding that occurrence, the general rule is not only to connect the small intestine to the stomach but also to connect the two limbs before they turn up

FIG. 92.—DIAGRAM ILLUSTRATING THE VARIOUS METHODS OF PERFORMING GASTRO-JEJUNOSTOMY. The dotted lines indicate the direction in which the small intestine (I) is carried. Thus *a* is the posterior gastro-jejunostomy, *b* is the retro-colic, and *c* the ordinary or pre-colic form of anterior gastro-jejunostomy. *St* = stomach. *D* = duodenum.

over the colon, or else to perform Roux's Y-operation, which is described on p. 271. It was with the view of avoiding these troubles and also those incident to the posterior operation that gastro-duodenostomy was introduced by Kocher. This operation is described on p. 278, but we may say here that it has not been taken up very much, chiefly no doubt because many ulcers are situated at or near the pyloric orifice.

In spite, however, of the objections mentioned above, the anterior operation still has its place under certain circumstances and must not be altogether cast aside. In our opinion, however, the retro-colic variety is unreliable and not to be recommended, as strangulation of the jejunum is very apt to occur at the aperture through which the loop has to pass in order to reach the anterior surface of the stomach; if this aperture be made sufficiently large to avoid all possible danger



and the operation has proved so very unsatisfactory under such circumstances that it is becoming the rule not to perform it when the pylorus is quite patent, or, if it is done, to take steps to constrict the pylorus. It has been found in experiments on animals, that when the pyloric orifice is patent, it is only in a small proportion of cases that the stomach contents pass directly down the efferent limb of the intestine; in some they still pass through the pylorus and re-enter the stomach through the anastomotic opening, in others exactly the opposite occurs, and in others again they pass into the afferent limb through the anastomotic opening and then regurgitate into the stomach through the same opening. The conclusion seems to be that when gastro-jejunostomy is performed and the pylorus is patent, either that orifice must be constricted by stitches applied outside it or Roux's Y-shaped anastomosis or a lateral anastomosis between the limbs of the intestine should be employed.

Other causes of a 'vicious circle' are connected with some *error in the technique of the anastomosis*, e.g. the formation of a spur at the point where the efferent limb leaves the opening, the occurrence of a kink in the intestine beyond, the presence of a long loop before the anastomotic opening which may become twisted on itself, or a twist in the efferent loop; lastly the opening made in the meso-colon in order to permit of the application of the jejunum to the posterior wall of the stomach may be too small or may not be properly fixed, and may constrict the intestine. The introduction of the 'no-loop' method has obviated some of these difficulties to a considerable extent; twisting of the intestine on the proximal side of the anastomotic opening is no longer possible and kinks at or beyond the opening should not occur.

Perhaps the most common cause of the condition is the *formation of a spur* in the intestine at the site of anastomosis, which guides the contents of the afferent loop into the stomach and prevents them from passing along the intestinal tract. This spur also makes it easier for the stomach to expel its contents into the duodenum than along the ileum. The dilatation of the duodenal loop that follows this backward propulsion of the stomach contents still further displaces the spur, so that it may ultimately act as a valve and completely occlude the efferent loop. Another cause of the affection is an *unduly long loop between the pylorus and the anastomotic opening*. When there is any considerable interval between the end of the duodenum and the anastomotic opening, the weight of the loop when filled with bile and pancreatic secretion tends to cause such an acute kinking at the stomach orifice that the bile cannot find its way into the ileum. A third, and most important, cause met with in the posterior form of the operation, is an *insufficient opening in the transverse meso-colon*, or imperfect attachment of the edges of this opening to the stomach. If the edges are imperfectly attached to the stomach, the meso-colon may slip downwards when the operation has been completed, and then a narrow opening in it constricts both the afferent and efferent loops, squeezing them together































way to prevent this is by the administration of turpentine enemata and aperients and the frequent use of the flatus tube. By the end of the third week the patient may be allowed to get up and may be considered well. For full details of after-treatment, see p. 209.

**Treatment of complications arising after the operation.—**  
**Of Bleeding :** This is usually the first complication to manifest itself. Occasionally, severe bleeding may occur during the course of the operation itself, but this is always easily arrested by ligature. The most serious form of bleeding met with in connection with this operation occurs within a very short time of the completion of the operation and is due to oozing from an unsecured vessel at the site of anastomosis. There is an impression prevalent that this complication is more common since the introduction of the large clamp for the posterior operation. The clamp prevents any bleeding at the time that the sutures are inserted, but if the inner or hæmostatic suture has been at all carelessly applied, bleeding may occur when the clamp is released, and will not be noticed owing to completion of the anastomosis. The first warning the surgeon generally has is the alarming pallor of the patient, who becomes faint after the operation and vomits large quantities of blood, subsequently also passing altered blood *per rectum*.

This condition is alarming and really dangerous and should not occur if due care be taken over the operation. There is a tendency in some quarters to look upon the operation as one that should be performed with great rapidity, and the natural result of undue hurry is to insert a faulty hæmostatic inner suture. If this suture picks up mucous membrane, submucous tissue, and the sero-muscular coats each time the needle is inserted, if it is evenly spaced and drawn uniformly tightly everywhere as it is introduced, there should be no risk of any recurrent bleeding. To make sure, we always relax the blades of the clamp for a few moments, after the posterior half of the suture has been inserted, and again just before the suture is completed. The surgeon is thus enabled to see at once if his suture has arrested the bleeding or not. If it has not, the bleeding point should be clamped and tied. It is possible that the recent appearance of this complication may be due to the practice of cutting away a considerable quantity of the mucous membrane of the stomach and jejunum. Removal of a small elliptical portion of both is undoubtedly helpful as facilitating accurate suture ; but if a large area is excised, the cut edge of the mucous membrane may somewhere retract and may not be taken up in the hæmostatic suture ; bleeding is then very liable to occur.

If the complication occurs, the patient should be placed bolt upright in bed with an ice-bag to the epigastrium, and made to swallow small pieces of ice, so that they may be carried direct to the seat of bleeding. Gallic acid and pil. saponis co., or pil. plumbi c. opio, may be given, and adrenalin chloride may also be tried. Unfortunately the existence of bleeding is usually not discovered until a large quantity of blood has been







by doing this the vertical measurement of the stomach may actually be increased so that, even allowing for some contraction subsequently, the sectional lumen of the viscus will not be diminished.

When the ulcer is not excised, but the base is thinned and perforation is probable, it should be infolded by a series of Lembert's sutures—as is done in some cases of perforated or actively bleeding ulcers (see p. 286)—and a gastro-jejunostomy performed, the pylorus being narrowed by stitches if it is not already contracted.

### TREATMENT OF ACTIVE GASTRIC HÆMORRHAGE.

The surgeon is not infrequently called in to treat this condition. In connection with operation under these circumstances, it is well to bear in mind that bleeding in cases of gastric ulcer is very rarely fatal *per se*, however profuse it may be for the moment, and that most cases of active hæmorrhage from a gastric ulcer can be checked by purely medical means and the bleeding does not necessarily recur. Further, if the hæmorrhage is severe enough to endanger the patient's life, this danger will be enormously increased by operative interference, and the resulting shock may be sufficient to bring about a fatal termination. Lastly it may be by no means easy to find the source of hæmorrhage, or to treat it appropriately when found.

The source of the hæmorrhage may vary considerably. Thus it may come from large vessels such as the coronary or gastro-epiploic arteries, or only a small branch may be involved. On the other hand, the bleeding may not be derived from any large vessel at all, but may come from superficial erosions of the mucous membrane, the oozing from which is exceedingly difficult to check. We therefore recommend that operative interference should only be undertaken on account of hæmorrhage pure and simple, when the bleeding is so severe as to threaten the patient's life if it continues any longer, and only after attempts to check it by medical measures have proved unavailing.

In all cases of active hæmorrhage from the stomach the patient should be confined to bed in the strictly horizontal position. The head should be kept low and a large ice-bag placed over the epigastrium. Ice may be given freely by the mouth and the patient should be kept quiet, and friends and relatives should not be allowed to see him. While the hæmorrhage is active, ergotinine citrate (gr.  $\frac{1}{80}$ ) may be injected subcutaneously, combined with morphine; these may be frequently repeated, and pil. saponis co. (gr. iij) may be given every four hours followed by gallic acid in ten-grain doses as the bleeding diminishes. Supra-renal extract is valuable in doses of five minims every three or four hours. Irrigation of the stomach with iced water may also be employed, a soft tube being used and great care exercised both in passing it and in performing the









the stomach is opened and can be stopped temporarily by pressure until the stomach contents have been evacuated. The difficulty is to treat the ulcer. Attempts have been made to excise it by introducing the hand along the posterior gastric wall through a slit in the omentum and gradually separating the ulcer from the pancreas, but the adhesions are generally too extensive and, further, the patient's condition is probably so bad that speed is of urgent importance. Under these circumstances one or other of the following measures may be adopted—namely, to pick up the vessel and tie it; to arrest the bleeding by the actual cautery; to underrun the bleeding vessel with stout catgut and tie it and a portion of the pancreas *en masse*; or to pass stitches through each side of the ulcer and tie them tightly so as to block the orifice of the vessel. The last plan is the best in the majority of cases.

*When the hæmorrhage comes from an ulcer of the pylorus or the first part of the duodenum*, the simplest plan is to perform a gastro-jejunostomy. The patient will certainly not be in a condition for excision of the ulcer either alone or combined with excision of the pylorus, and unless there is actual erosion of a considerable vessel, the bleeding will stop when the gastric contents cease to pass over the ulcerated surface.

*When the bleeding is the result of very free oozing from the mucous membrane or when no bleeding point can be found*, a gastro-jejunostomy will usually suffice. The cautery applied at a dull red heat to a simple erosion will sometimes check the bleeding from it, but usually the best plan is to swab over the oozing surface with adrenalin chloride (1 in 1000) or five minims of supra-renal extract in a little water, and then to perform a gastro-jejunostomy. Some supra-renal solution may be introduced and left in the stomach while the anastomosis is being made.

From the nature of things it cannot be expected that the rôle of surgical intervention for the purpose of saving a life imperilled by severe bleeding is likely to be a very brilliant one, as the condition of the patient must necessarily be so unsatisfactory. Indirectly, however, hæmorrhage is treated by surgical means with great success in cases in which the bleedings are small and repeated and threaten, if allowed to persist, to endanger the patient's life. These cases really fall under the first group already described (see p. 256). When called upon to interfere for active hæmorrhage, the surgeon will nearly always find that the bleeding has been checked by medical means, but that the hæmorrhages have been so free and so often repeated that something must be done to stop them permanently. Under these circumstances it is best to wait for a short time, if possible, until the patient has to some extent recovered from the immediate loss of blood; but if the hæmorrhages are repeated daily or every few days this is not permissible, and excision of the ulcer, gastro-jejunostomy, or both, must be practised immediately.



by a free incision from the xiphoid cartilage to the left of the umbilicus in the manner already described (see p. 32). The peritoneum must be opened with care as there may be adhesions between an ulcer on the anterior wall of the stomach and the parietes.

*Finding the perforation.*—The diagnosis is usually confirmed immediately the abdomen has been opened, by the escape of gas and sour-smelling gastric contents. Whether this be so or not, the incision is widely retracted, abdominal cloths are packed in, especially at the lower angle and sides of the wound; and the stomach is drawn gently out of the wound and packed behind with other abdominal cloths. As the ulcer is on the anterior wall in the majority of cases, it is seen without any difficulty; if, however, it is not evident, the pyloric region and the first part of the duodenum should be next examined and, failing that, the cardiac end of the stomach. As a rule the seat of the ulcer is easily detected, as slight pressure on the abdomen or the stomach causes gas to bubble out at the opening; this bubbling can be both heard and seen.

Should no ulcer be found on the anterior surface, the posterior wall of the stomach is examined in the way described on p. 281. In this situation extravasation is uncommon, and if it does occur, it is generally into the lesser cavity of the peritoneum, which becomes shut off from the general peritoneal cavity. If left, suppuration occurs and an abscess forms which may spread in various directions, most commonly in the subphrenic region; this must be opened and drained. The treatment of subphrenic abscess is dealt with in Chap. XXVI.

*Closure of the perforation in the stomach.*—Attention is next directed to the closure of the perforation in the stomach. Theoretically, the simplest plan is to invaginate the stomach wall over the area of the ulcer and to suture the opposing surfaces with one or more continuous sero-muscular sutures. This is often difficult, however, as there is much induration around the edge of the ulcer; but if the stitches are passed far enough away from the perforation it can usually be closed, and if an excessive degree of narrowing is produced gastro-jejunostomy should be performed. In other cases it will be better to excise the ulcer, especially if it is of limited extent.

In the rare cases in which the ulcer is very large and its walls so dense and thickened that they can neither be inverted nor safely excised, it has been proposed to close the opening by turning up a portion of the omentum and fastening it over the base of the perforated ulcer with catgut stitches. To this should be added a gastro-jejunostomy (see p. 265), if the patient be in a condition to bear it; this may be rapidly done, and will give the patient a good chance of recovery. This plastic method of covering up the perforation with a portion of omentum is also particularly applicable to ulcers in the neighbourhood of the first part of the duodenum; in some cases the gall-bladder has been stitched over the opening.



### TREATMENT OF CONTRACTIONS AND ADHESIONS OCCURRING IN CONNECTION WITH A GASTRIC ULCER.

Here the surgeon has to treat not the ulcer itself, but its sequelæ, for the ulcer may have healed and the patient's symptoms be caused entirely by the cicatricial contraction consequent upon this. Various conditions may require remedy ; stenosis of the pylorus may occur, or there may be constriction of the stomach itself, which usually takes the form known as ' hour-glass contraction.' Besides this there may have been extensive perigastritis leading to adhesions between the stomach and one or more of the adjacent viscera. It will be best to describe the treatment of each of these conditions separately although more than one of them may be met with at the same time.

#### TREATMENT OF STENOSIS OF THE PYLORUS.

A method of treatment which was formerly much practised and is still employed under certain circumstances is that introduced by Loreta ; he forcibly dilated the pyloric orifice with instruments or with the finger passed through it from an opening in the stomach until the lumen had been dilated as much as possible without splitting the peritoneal coat. Loreta's operation has not fulfilled the hopes entertained of it ; experience shows that contraction is apt to recur, and in a short time the patient's condition is as bad as ever. Accidents have also happened, such as splitting of the cicatricial tissue and perforation into the peritoneal cavity, and the operation has now been abandoned in cases of cicatricial stenosis. At the present time the surgeon makes his choice between the operations of pyloroplasty and short-circuiting ; gastro-duodenostomy may be done in some cases, but gastro-jejunostomy is the usual form of short-circuit operation. Pylorectomy has also been performed for this condition, but it is a much more severe operation than any of the others, and in these particular cases it is especially difficult and dangerous, because of the adhesions in the neighbourhood of the pyloric orifice. We do not therefore advise the operation for a simple stricture of the pylorus.

**Pyloroplasty.**—Pyloroplasty is certainly suited for some cases of narrow annular stricture, but as a rule subsequent contraction takes place which may lead to recurrence of the symptoms.

We should limit this operation to cases of dilatation of the stomach due to narrowing of the pylorus where there are no adhesions, no marked thickening of its walls, and no atony of the stomach. The principle of the operation is to make a free longitudinal incision from the stomach to the duodenum, dividing the pylorus along its long axis, and then to approximate the two ends of this incision so as to convert it into a transverse





duodenum and cut down upon this as a guide ; if preferred, a pair of probe-pointed scissors may be used to slit up the pylorus. A mattress suture (see Fig. 87) is inserted at each end of this incision, and when this is tied, what were formerly the ends of the incision become the central points and the line of incision is converted from a horizontal into a vertical one (see Fig. 106). This suture should be of silk, and should be reinforced by two others on each side, so that the edges of the incision are brought together throughout ; the operation is completed by burying these sutures with a continuous sero-muscular suture of fine catgut. The area of operation is then cleansed, the abdominal cloths are removed, and the abdomen closed in the usual manner (see p. 215).

**Gastro-jejunostomy** is called for when there is much cicatricial tissue which would necessitate a long incision, thus rendering the approximation of the edges of the wound by pyloroplasty difficult. The

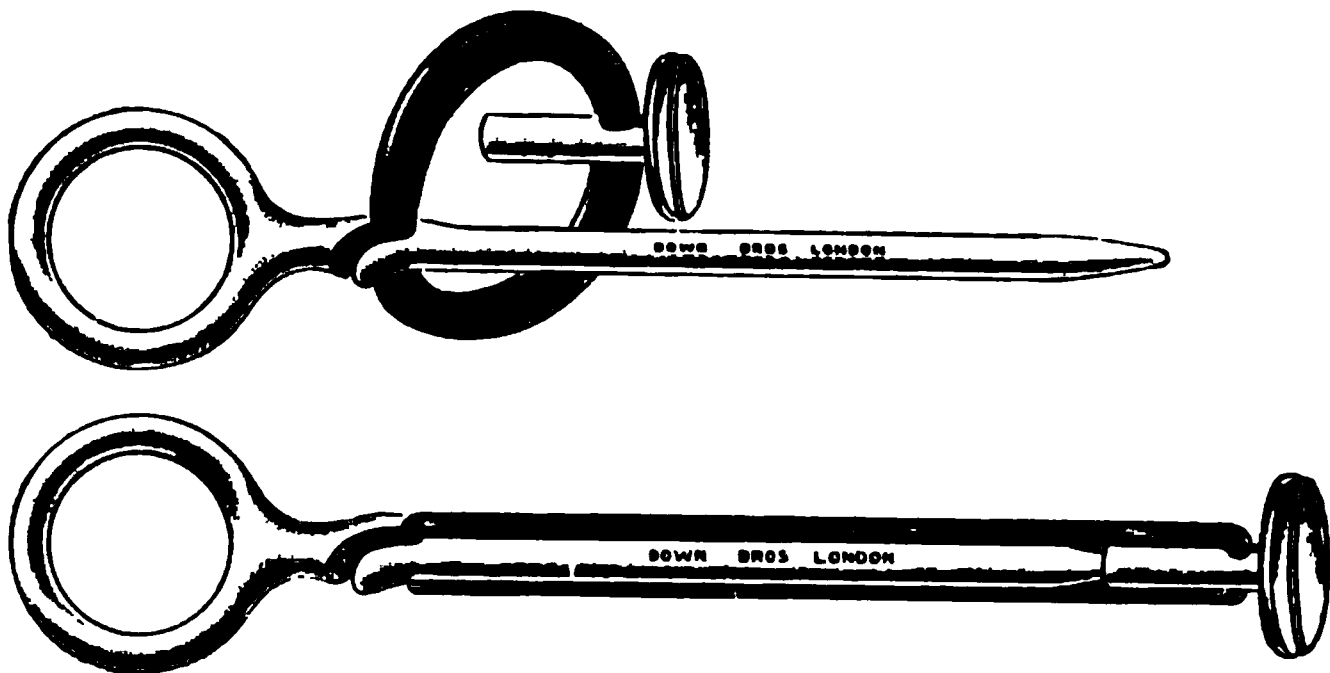


FIG. 107.—LANE'S INTESTINAL CLAMPS. A very useful type of clamp when the bowel has not a long mesentery, as it is easy to push the metal stem behind the bowel in any position. The rubber is stretched across the front of the bowel and effectually but lightly compressed. The sketch is full size.

posterior operation (see p. 265) should be chosen, and if the opening is made sufficiently large, the result is satisfactory. In some cases, however, the stomach is so bound down that an anterior gastro-jejunostomy is preferable.

**Gastro-duodenostomy** or the anastomosis of the duodenum with the stomach, is suitable for cases in which the adhesions are not too extensive to prevent the descending portion of the duodenum being freed and brought over to the anterior surface of the stomach (see p. 278).

#### TREATMENT OF ' HOUR-GLASS CONTRACTION.'

For the treatment of this condition the surgeon has at his disposal the operations of gastropasty, gastro-gastrostomy, or gastro-jejunostomy.

**Gastropasty.**—This operation can only be done when the constriction between the two portions of the stomach is the chief mischief

and is not accompanied by extensive induration or distortion of the surrounding stomach wall. An incision is made in the anterior wall of the stomach parallel to the curvatures, extending at least an inch beyond each end of the constriction. The incision is carried into the interior of the stomach just beyond one end of the stricture, and the constriction is divided by pushing either a probe-pointed bistoury or one blade of a pair

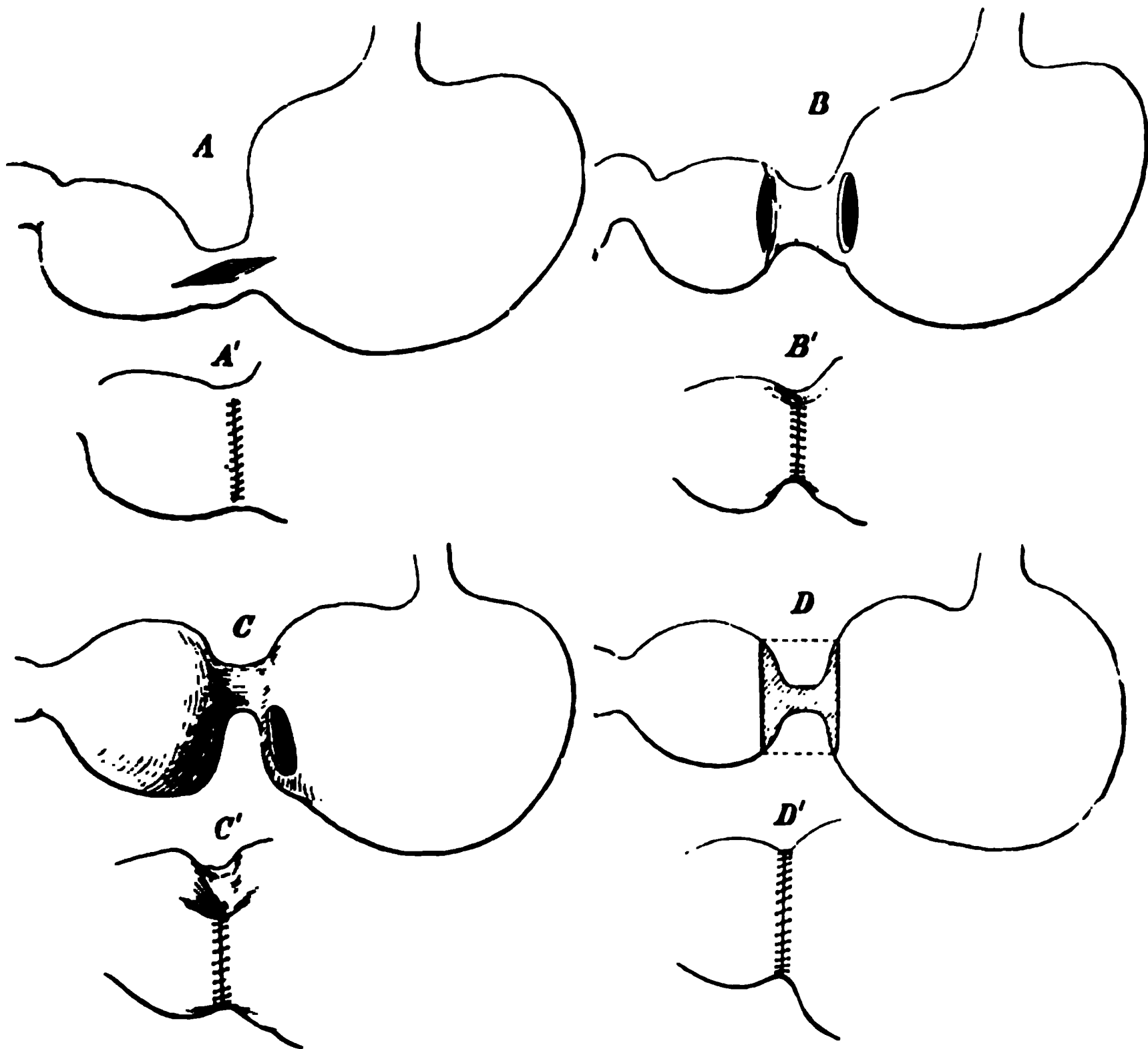


FIG. 108.—METHODS OF TREATING AN ' HOUR-GLASS CONTRACTION ' OF THE STOMACH. *A* and *A'* show the two stages of gastropasty, *B*, *B'* and *C*, *C'* the stages of gastro-gastrostomy under different conditions, while *D*, *D'* shows partial gastrectomy combined with subsequent gastro-gastrostomy, the shaded portion being the part excised.

of probe-pointed scissors along the narrow portion so as to divide the stricture throughout. This longitudinal incision is now converted into a transverse one by approximating the ends of the incision with sutures of silk (see p. 278) ; if there is little tension, but fairly free oozing, a continuous stitch taking up all the coats of the stomach may then be inserted, but should the tension be considerable, mattress sutures should be used. Outside the first line of sutures a continuous sero-muscular suture of fine catgut completes the closure (see Fig. 108, *A*).

This operation may fail for two reasons. In the first place the artificial opening thus made diminishes in size as the cicatrix contracts, and recurrence of the stricture takes place. In the second place adhesions are very likely to form as the result of the manipulations about the stomach and this may subsequently interfere with the functional result. The first difficulty can be met to a considerable extent by making the incision into the stomach long enough to give a wide opening and allow for the subsequent contraction. The second can only be met by performing the operation as quickly as possible and by taking care that the surface of the organ is not irritated mechanically or chemically.

**Gastro-gastrostomy.**—When the stomach is divided into two large and distinct sacs the operation of gastro-gastrostomy has been performed (see Fig. 108). In this the actual constriction is left alone and the dilated portions on either side are united by an ordinary lateral anastomosis, usually below or in front of the seat of constriction. The anastomosis is made by simple suture, and a glance at Fig. 108, *B*, will explain its mechanism. The operation is really not very satisfactory and is only of use when the constriction is merely a part of extensive distortion of the walls of the stomach which renders it impossible to perform a satisfactory gastroplasty.

**Partial gastrectomy.**—It has been proposed that, when the distal portion of the constricted stomach is very small, a partial gastrectomy should be performed, the small distal portion of the stomach being removed and the end of the duodenum implanted into the part left behind (see p. 307). This is a severe operation and offers no particular advantages over other methods. When the constriction is in the middle and there is much induration, the whole constricted area may be excised and the two halves of the stomach reunited (see Fig. 108, *D*). This suggestion should be borne in mind, especially when the proximal sac is the smaller of the two.

**Gastro-jejunostomy.**—This operation is very useful, but, as it puts out of use the distal portion of the stomach, it should not be performed except when the stricture is near the pyloric end, and when one or other of the procedures already referred to is not applicable. It will chiefly be employed for the cases in which the surface of the stomach is markedly deformed by adhesions from perigastritis due to extensive or multiple ulcers. Plastic operations upon the stomach under these circumstances are not satisfactory.

With regard to the question of gastro-jejunostomy, it is well to remark that it has happened more than once that the anastomosis has been made between the distal portion of the stomach and the jejunum instead of between the latter and the proximal sac. This is particularly likely to occur when the constriction of the stomach is near the cardiac end, and the result is of course that the patient obtains no relief. Consequently the surgeon must make quite certain of the topography of the stomach and



In other cases, extensive broad adhesions are met with which are much more difficult to separate, and when separated, large raw surfaces are left behind that are unfortunately only too prone to contract fresh adhesions. These cases are often extremely disappointing ; the immediate results may be very brilliant, but, as time goes on, the old symptoms gradually reappear as the fresh adhesions contract. At the same time the operation is always worth doing because the adhesions may not re-form in exactly the same way, and the troublesome symptoms may be relieved. It is well during healing to try, by putting the patient into 'suitable positions, to prevent recurrence of the same sort of adhesions as before. For example, if the stomach and colon are tucked up under the liver, the patient should be propped up in bed as soon as possible after the operation, so that the stomach falls downwards, or if necessary he may actually sit up or lie upon one side. Particular care must of course be taken under such circumstances to secure thorough stitching of the abdominal wall. The actual management of these cases cannot be described in detail as everything depends upon the particular conditions met with. In all operations for adhesions special care is necessary to manipulate the abdominal cavity as little as possible and avoid giving any cause for fresh adhesions. Many surgeons now make it a practice to steep their abdominal cloths or the sterile gauze used for packing aside the intestines in some sterilised bland substance, such as vaseline or pure paraffin, in order to make sure that no mechanical irritation of the parts occurs. This precaution is a good one, as the mere contact of a cloth with the peritoneal coat of the bowel for quite a short time leads to effusion of lymph and subsequent adhesion of the two structures. Sterilised vaseline may also be smeared over the raw surfaces to prevent them sticking together immediately after the operation.



and to its right side. When vomiting and wasting are combined with visible peristalsis and the presence of an enlarged pylorus the diagnosis is certain. The mistake generally made is to look upon the case as one of simple marasmus. If the condition is unrecognised or comes under treatment too late, the child continues to vomit and waste, convulsions set in, and death occurs from exhaustion.

**TREATMENT.**—The experience of our colleague, Professor G. F. Still, and others, seems to show that much may be done by purely medical treatment if the case is taken in hand early enough; and it seems probable that, in future, surgical intervention will be reserved for the cases which come under notice too late for medical treatment and for those in which medical treatment fails, and consequently the results of surgical treatment will apparently be less favourable than formerly.

(a) **Medical.**—In all cases this should be given a fair trial in the first instance, for experience shows that a number of cases are cured by it alone. The essential point in the medical treatment is frequent lavage of the stomach, and with this should be combined the administration of previously digested food and, if necessary, rectal feeding. If the patient is very wasted, and particularly if surgical intervention is likely to be required, subcutaneous infusions of normal saline solution may also be employed.

The *lavage* of the stomach is an easy matter. The child soon gets used to it and does not resent it; indeed, the relief gained is very noticeable. It should be done at least once daily, and oftener if the distention and discomfort seem to demand it. It is effected by means of a No. 10 Jaques's red-rubber catheter and a glass funnel, the fluid used being warm water containing a little bicarbonate of soda or boric lotion. About two ounces of fluid are introduced at a time and then syphoned off, and the process repeated until all curd has been washed out of the stomach. If the catheter be lubricated with a little glycerine, the child will swallow it readily and suck at it contentedly throughout the operation.

The *food* should always be given in small quantities—two to four drams at a time—and it is well to peptonise it. White wine whey, and raw meat juice or very weak peptonised milk are favourite foods in the practice of Professor Still. Food should be given every hour or two according to the child's condition.

Only in bad cases will it be necessary to have recourse to *rectal feeding*. When the vomiting is intractable it may be used as a preliminary to surgical intervention. Each enema should consist of about two ounces of peptonised milk with a few drops of brandy, and may be given every four hours.

*Subcutaneous saline infusions* may be called for if the child is very ill, and are specially useful as a preliminary to operation. The infusion may be made with a hollow needle connected by rubber tubing with a funnel through which four to six ounces of sterilised salt solution at the body





seized in catch-forceps and held up by an assistant so as to prevent the escape of the gastric contents.

The dilatation of the pylorus is now undertaken. We use Hegar's dilators for this purpose, passing one after the other through the pyloric opening until this admits the little finger easily. This is a very safe method but somewhat tedious, and it requires considerable judgment to perform full dilatation without actually splitting the pylorus. The expansion is carried out until the peritoneal coat shows signs of splitting or the superficial fibres of the pyloric ring give way. The dilator is then withdrawn, after which we are in the habit of introducing a feed of four ounces of weak peptonised milk through a catheter into the duodenum. The incision in the stomach is then closed rapidly in the usual way and the abdomen sewn up.

The chief danger in the operation is rupture of the pylorus or perforation of the duodenum. Rupture of the pylorus generally takes place on its posterior aspect and may escape notice at the time of the operation; it can only be guarded against by the greatest care in performing the dilatation. In all the cases in which this accident has occurred in our hands, the rent has been sutured as in pyloroplasty (see p. 289) and the patient has recovered; in the case in which perforation of the duodenum occurred, the accident passed unnoticed and fatal peritonitis ensued.

*The after-treatment* demands great care and to it the successful results are largely due. At the completion of the operation a hypodermic injection of half a drop of liquor strychninæ may be given, and it is always well to run in four to six ounces of saline solution beneath the skin in the groins or axillæ. For the first eight hours the child is fed entirely by rectum. After that time mouth-feeding is begun in very small quantities (*vide supra*) and gradually increased. The feeding must be attended to with the greatest care for weeks or even months after the operation. Breast-feeding, either by the mother or by a wet nurse, should be employed as the child recovers. There is a remarkable tendency to the supervention of diarrhœa soon after the operation, apparently as the result of food passing down the intestine again.

### NON-OBSTRUCTIVE DILATATION OF THE STOMACH.

Dilatation of the stomach may occur without any organic obstruction to the exit of its contents or adhesions interfering with its mobility. It may be an acute or a chronic condition.

*Acute dilatation* of the stomach is a very serious condition, and unless recognised and treated early not uncommonly proves fatal. It may occur rapidly and may or may not be accompanied by the same condition in the intestines. The stomach may become enormously distended

both with gas and fluid, and frequent vomiting soon sets in accompanied by prostration, pain, hiccough, and constipation. If the stomach is the only organ which is distended, its outline is quite evident as a large, somewhat pear-shaped swelling at the upper and left side of the abdomen. Even if there is a good deal of abdominal distension, the firmer outline of the stomach can usually be detected and percussion will also help in the diagnosis. There is also frequent vomiting without relief of the condition.

The *pathology* of acute dilatation is by no means clear. It seems to be a paralytic condition of the stomach rather than a contraction of the pylorus or intestine, as has been suggested. The cases which we have seen have usually been associated with some other abdominal trouble, especially acute appendicitis, and it seems to be some toxæmic or reflex effect.

**TREATMENT.**—The best way is to empty the stomach by means of a tube and then wash it out. We have had a case in which the stomach had so completely lost its contractile power that the only way of emptying it was by putting the patient in the Trendelenburg position. The stomach tube should be used regularly three or four times a day until the contractile power has been regained. Strychnine and antispasmodics may be of value.

*Chronic dilatation* of the stomach without constriction of the pylorus is most frequently a part of Glénard's disease, and the stomach is usually abnormally low down. The treatment is lavage of the stomach combined with the measures recommended for enteroptosis. Operations such as gastro-jejunostomy and gastro-plication do not seem to benefit the patient.

## CHAPTER XIX.

### CANCER OF THE STOMACH.

BENIGN growths may occur in the stomach, but they are usually mere pathological curiosities, and the diagnosis is rarely made without an exploratory laparotomy. The simple tumours met with have been generally myomata or fibromata—the former being the more common. They must be removed if possible.

The most common malignant tumour of the stomach is undoubtedly a carcinoma. Sarcoma of the stomach, although occasionally met with, is of extreme rarity.

Carcinoma of the stomach is not an uncommon form of malignant disease, about 2 per cent. of all deaths from cancer occurring from this affection. Men and women appear to be affected in equal proportions; the disease is most common between forty and sixty years of age, and is said to be more prevalent in the tropics than in temperate climates. It is almost invariably a primary lesion, but is sometimes secondary to carcinoma of the œsophagus, pharynx, or breast. The neighbourhood of the pylorus is the most common situation of the affection, about 60 per cent. of all cases starting in that region, and it often seems to arise on a pre-existing ulcer of the stomach.

The growth is usually a cylindrical epithelioma with marked colloid degeneration, and it spreads to a remarkable extent in the coats of the stomach, especially along the lesser curvature. The lymphatic glands are affected comparatively early, the first involved being those along the lesser curvature and those running up towards the liver. Before long, however, the glands in the omentum and about the pancreas enlarge, and the latter is a point of great practical importance, as glands in this situation are extremely difficult to remove satisfactorily. The disease may involve the liver, spleen, or pancreas by direct continuity, and occasionally the case terminates by a general cancerous infection of the peritoneum.

The *symptoms* will vary according to whether or not there is obstruction to the passage of food.



then that of cancer of the pyloric end ; and finally that of cancer at the cardiac end.

**I. Of non-obstructive cancer of the stomach.**—Here the growth is usually situated on the anterior surface or on the lesser curvature, and when it is small and unaccompanied by glandular enlargement or adhesion to surrounding structures it may be possible to extirpate it with a fair prospect of cure. It must, however, be admitted that the number of cases that come under observation in which this is feasible is very small, because when the growth is small enough to be easily removed, it commonly happens that no tumour can be felt from the outside and the diagnosis is not made.

**Gastrectomy.**—Extirpation of portions of the stomach for cancer—*partial gastrectomy*—is not a hopeful procedure. This depends not so much upon the fact that the operation in itself is severe, because the most extensive operations, even those involving a resection of the entire stomach, have been performed without the patient succumbing, but on the fact that the growth spreads rapidly through the stomach wall, and recurrence after these partial operations is almost invariable.

If radical measures are to be undertaken in these cases with any hope of avoiding recurrence, they should take the form of excision of the whole or the larger portion of the stomach—*complete gastrectomy*. Although the entire stomach has been removed for cancer with temporary success, the number of cases in which this can be done is not large, and we do not look upon the operation as at all a favourable one. The chief objections are that when cancer involves a large part of the stomach the disease is very likely to be extensively diffused both through the neighbouring glands and through structures that have become adherent to the stomach. When glands are found to be extensively affected, extirpation of the primary growth should not be attempted. In connection with enlarged glands it is important to remember that they may be met with not only in cancer, but also in simple ulcer of the stomach, and they may give rise to considerable difficulty in diagnosis. The question may be settled by dissecting out one of the glands and making a rapid microscopical section. Even to the naked eye the typical hard whitish cancerous gland differs markedly from the soft swollen juicy glands associated with inflammation.

In the rare cases in which the operation may be done, the stomach is divided at the cardiac and pyloric ends and the viscus is removed entire, the duodenum being subsequently sutured to the cardiac end of the œsophagus.

Should it be found on performing an exploratory laparotomy that the growth is so large and so extensively diffused over the surface of the stomach as to negative a radical operation, the best plan is to close the abdomen without doing anything further. It has been suggested that when the disease in the stomach is so extensive as to prevent the patient taking food, the operation of duodenostomy, or preferably jejunostomy,



while rectal feeding is of very little value under these circumstances. If, however, the stenosis is slight, it may be advantageous to devote a week or so to feeding the patient with concentrated nutritious food, such as soups, peptonised milk, and meat juice, whilst the stomach is washed out twice daily with boiled water to get rid of any fermenting contents; at the end of each irrigation 10–15 grains of salol may be introduced and left in the stomach.

The anæsthetic employed for the operation should be ether (open or intravenous), or the A.C.E. mixture. Before commencing the anæsthetic the stomach should be emptied and washed out. All the precautions against severe shock, referred to in connection with severe abdominal operations on p. 199 must be adopted.

The incision should be rather to the right of the middle line and extend from the xiphoid cartilage to below the umbilicus. On opening the peritoneal cavity, the condition of the pylorus should be first examined, especially its mobility, the presence or absence of adhesion to

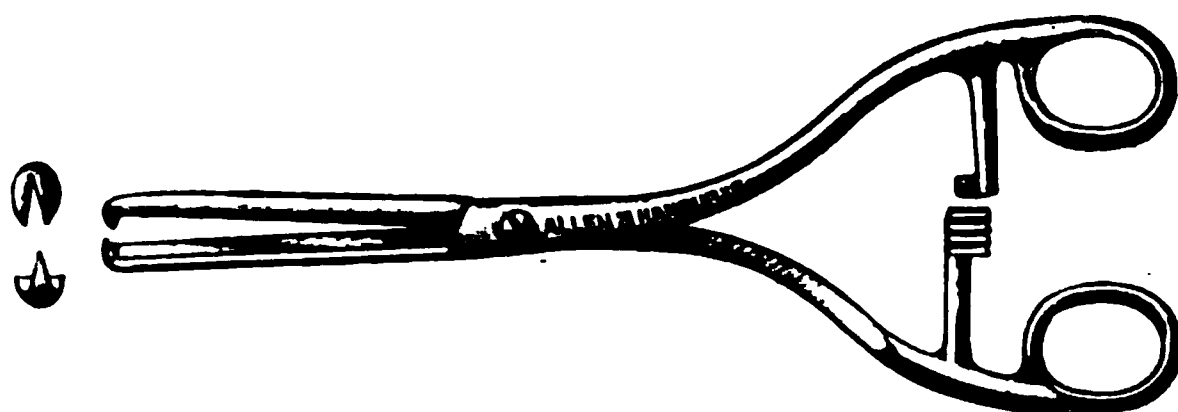


FIG. 109.—CLAMP FORCEPS FOR USE IN PYLORO-GASTRECTOMY. These are very useful for dividing the omenta. They crush firmly and have toothed ends that prevent the structures slipping out of the ends of the forceps.

surrounding structures, and the presence and distribution of enlarged glands. The posterior surface of the pylorus can be explored by tearing a hole in the lesser omentum immediately above it and introducing the finger behind it. This also allows the posterior surface of the stomach and the pancreas to be examined, and the presence or absence of enlarged glands in front of the vertebræ or above the pancreas can be made out.

When this has been done and the operation has been decided upon, the first step is to free the pylorus. The edges of the abdominal wound are widely retracted, the general peritoneal cavity is carefully packed off with abdominal cloths, and the pylorus freed by dividing the gastro-colic omentum between two pairs of long clamp-forceps (see Fig. 109). The vessels in the omentum can be tied separately or *en masse*, after the pylorus has been removed. The lesser omentum, as a rule, can be divided by tearing it with the finger if care be taken to keep close to the pylorus; any bleeding vessels can be picked up as they are divided. A point of great practical importance is to detach the lesser omentum right up to the cardiac end and well above the lesser curvature so as to ensure that the glands contained in it are removed. The pyloric and gastro-duodenal





connection with the pylorus. If the stomach is now turned well over to the left the coeliac axis will be exposed, and the coronary artery is ligatured and divided.

Before proceeding to divide the stomach, it is a good plan to perform

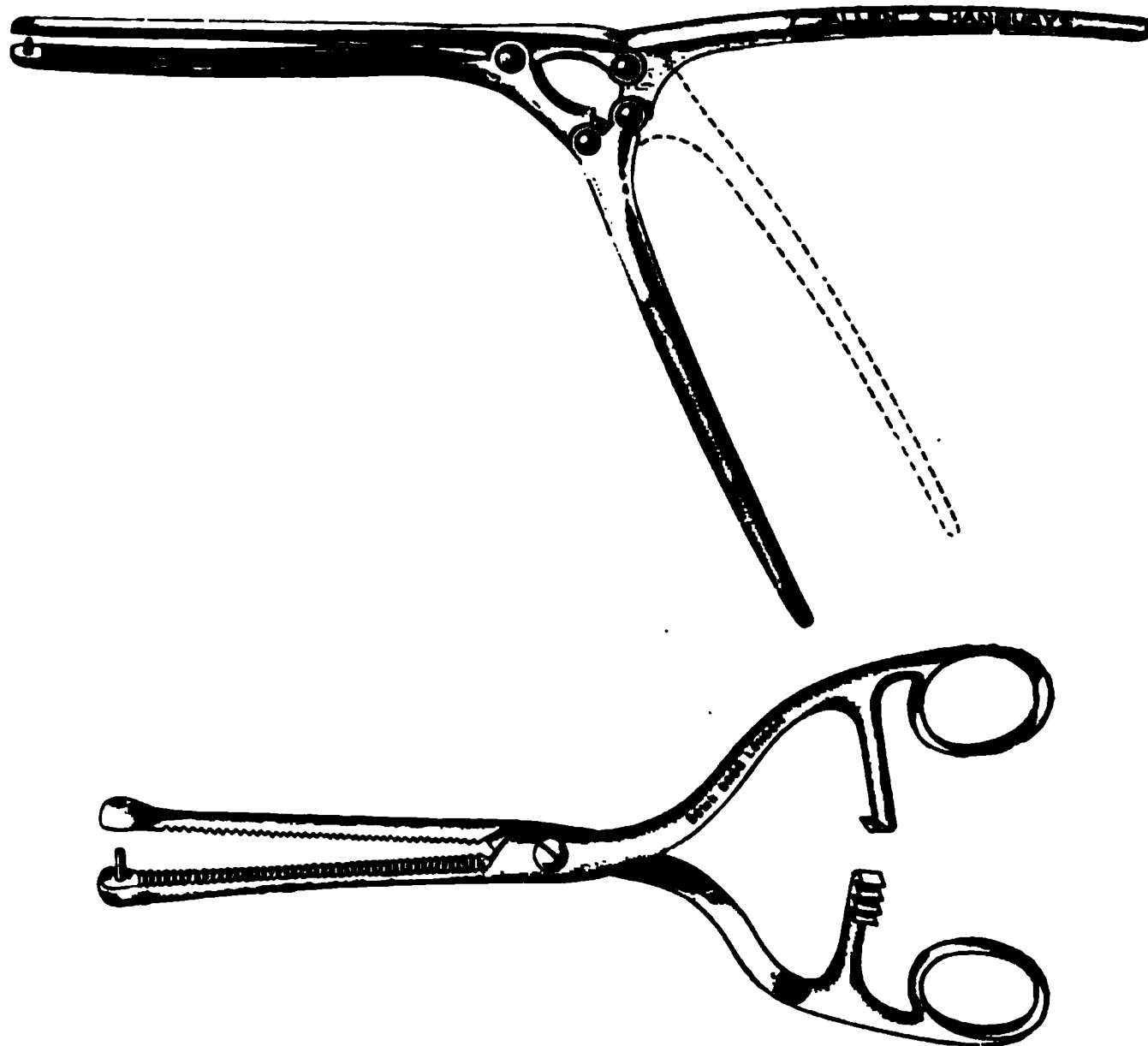


FIG. 110.—CRUSHING CLAMPS FOR INTESTINAL RESECTION. The upper figure shows a very powerful type by which the thickest parts of the intestine are easily reduced to the thickness of tissue paper. The dotted line shows the position of the upper handle when the forceps are closed. The lower figure is a useful form for all small intestine resections.

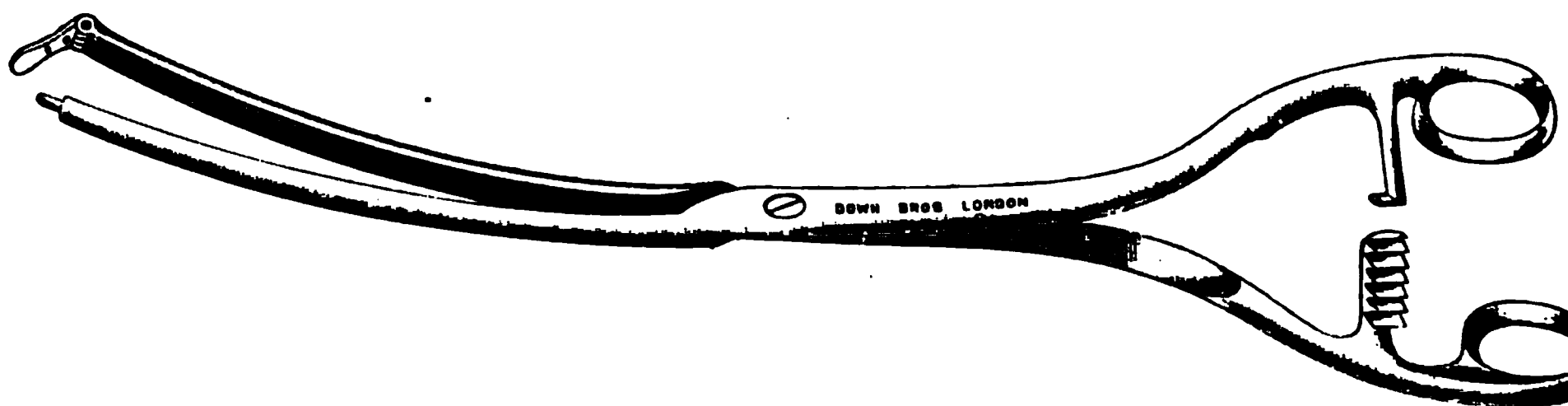


FIG. 111.—KOCHER'S PYLORECTOMY CLAMP FORCEPS. There is a catch at the ends of the blades to maintain the pressure and to prevent any portion of the stomach wall escaping from their grasp.

the gastro-jejunostomy, as it is done much more easily than after the bulk of the organ has been removed. The operation is quite similar to that described on p. 265 ; the only important point to remember is that there must be plenty of room between the anastomosis and the proposed line of section of the stomach—in other words, the anastomosis





ment opening in the duodenum or the jejunum. This may be called for when the cancer is too far advanced for excision and also when it spreads so extensively over the surface of the stomach that there is no possibility of performing a gastro-jejunostomy successfully. A permanent opening on the further side of the growth is therefore the only means of prolonging the patient's life, but in these cases he is so near death when the operation is performed that the chances of any material prolongation of life are extremely slight.

The operation is done through the ordinary vertical incision, slightly to the right of the middle line, and the duodenum, if possible—or, failing that, the jejunum—is brought up into the wound, fixed in position by sutures and an opening made and a tube fastened in, as in gastrotomy (see p. 183). Witzel's or Kader's methods are the best in these cases, as the opening in the bowel must be very small so as not to interfere with the passage of bile and pancreatic secretion past the artificial orifice ; it is particularly important not to form a spur, as is done in inguinal colostomy, otherwise the bile and pancreatic secretion will be discharged through the wound, to the patient's great discomfort and disadvantage.

**3. Of cancer of the cardiac end of the stomach.**—This condition is practically identical with malignant disease of the cardiac end of the œsophagus—at any rate, as far as its treatment is concerned (see p. 180). Gastrotomy or jejunostomy are the only surgical procedures.

## CHAPTER XX.

### DUODENAL ULCER: JEJUNAL ULCER.

#### DUODENAL ULCER.

ULCER of the duodenum first attracted attention in connection with burns, and in these cases is supposed to be due to some toxic condition in connection with the septic state of the wound. The ulcer is generally in the first part of the duodenum, and most often above the entrance of the bile-duct. Hæmorrhage not infrequently results, and sometimes perforation. Uræmic and tuberculous ulcers have also been described.

The condition to which we refer in this chapter is, however, the chronic duodenal ulcer, which is not at all uncommon and which in its characters and probably in its origin is closely allied to the chronic gastric ulcer. The great majority of these ulcers are situated in the first part of the duodenum, and occur most often in men about middle life.

The *symptoms*, which have been especially worked out by Moynihan, are as follows: There is often a history of weight and distension in the epigastrium after meals, to which very little attention is paid, but later the patient begins to notice that pain, which is often very severe, comes on two hours or more after food, or earlier if the diet is fluid. It is relieved by taking food; Moynihan has therefore given the name of 'hunger pain' to this symptom. Vomiting is rare. The symptoms are not constantly present, but come on in attacks, most often in winter. Heartburn or pyrosis is not uncommon. Little or nothing may be made out on examination, but in some cases there may be tenderness in the middle line, combined with some rigidity and increased reflex of the upper part of the right rectus.

Hæmorrhage is a common complication of duodenal ulcer and its presence is a very strong point in favour of the diagnosis. It may be present in large amount, giving the characteristic melæna, but in many









## CHAPTER XXI.

### INJURIES OF THE INTESTINES, THE OMENTUM, AND THE MESENTERY.

THESE injuries closely resemble those of the stomach, and only the special points relating to them need be considered in detail. The effects of the injury differ according as it is caused by a sharp or a blunt instrument, and the two important results which may be produced are bleeding and injury to the intestinal wall.

Severe and often fatal *hæmorrhage* may occur from the omentum or the mesentery as the result of an external injury, while the intestine itself may escape. The lesion in the omentum or mesentery may vary from a simple longitudinal tear rupturing only one or two vessels, to an extensive laceration, or even detachment of the mesentery from the spine or from the bowel ; in the latter case very serious secondary intestinal troubles may result from the injury to the blood-supply of the bowel if the patient survives long enough. On opening the abdomen after an injury and finding blood, the surgeon must bear in mind that there are various other and more probable sources of the hæmorrhage than injury of the omentum or mesentery, and he must more especially examine the liver and spleen.

As the result of an external injury, partial or complete *rupture of some portion of the intestinal canal* may occur. The parts most frequently affected are the jejunum and the ileum ; but in severe crushes, as when a heavy cart passes over the abdomen, the more fixed portions of the intestine, such as the duodenum and the ascending or descending colon, suffer most. The injury may vary from a simple contusion to an extensive laceration or complete division of the intestine ; the injuries may be limited to one coil of bowel or they may be multiple. As a rule they are more often multiple in penetrating wounds than in contusions ; the possibility of multiple injuries must be borne in mind when the abdomen is opened for the purpose of investigating cases of this kind.































purgatives after that period. When the injury has only affected the small intestine, the patient should have an enema daily, and if anything further is required, some saline mineral water may be administered; no violent purgatives should be employed at first. When there is much pain, fifteen grains of aspirin and twenty grains of bromide of potassium may be given *per rectum*, or heroin (gr.  $\frac{1}{2}$  to  $\frac{1}{4}$ ) may be administered hypodermically. It is well to avoid the use of morphine, so as not to paralyse the intestine. In injury to the large intestine enemata should not be employed.

### TREATMENT OF INJURIES TO THE INTESTINE WHEN PERITONITIS IS ESTABLISHED.

It not infrequently happens—especially in gunshot wounds on the battle-field—that the patient is not seen until some long time has elapsed, and then the nature of the case is essentially different and it becomes practically a septic peritonitis of the very worst type. When once general peritonitis has become established there is no object whatever in operating in the great majority of cases, as there is practically no likelihood of cleansing the abdominal cavity and thus arresting the septic peritonitis, whilst the mere operation, involving as it does a great amount of shock from the handling of inflamed intestines, will probably prove fatal. As a matter of fact the best chance for the patient is to place him at absolute rest in the hope that the peritonitis may become localised and that an abscess, or—in the case of a perforating abdominal wound—a faecal fistula, may form. At most a small opening may be made and one or more drainage tubes inserted.



## CHAPTER XXII.

### ACUTE INTESTINAL OBSTRUCTION.

OBSTRUCTION to the passage of fæces and other materials along the intestine may vary in degree from a slight difficulty to complete stoppage ; in other words, the obstruction may be incomplete or complete. Two forms of intestinal obstruction are met with—namely, acute and chronic. These differ markedly not only in their symptoms, but also in their pathological conditions and must be discussed separately.

In cases which belong to the group of primarily acute intestinal obstruction, two important conditions are present : in the first place there is sudden and complete arrest of the passage of the intestinal contents, and in the second place the condition which gives rise to this arrest is one which also threatens the vitality of the portion of bowel involved. Hence the symptoms are urgent and severe and the prognosis is grave.

The *symptoms* vary somewhat according to the cause of the obstruction, but the following is the usual course of events : Previous to the onset of the obstruction, the patient has usually been in perfect health, and then, after some cause such as a severe strain or violent movement or sometimes without any apparent cause, he is suddenly seized with acute abdominal pain, usually referred first to the region of the umbilicus or the epigastrium, but soon accompanied by intermittent attacks of colic. At the onset there may be marked collapse and pallor, with a small and thready pulse. Vomiting occurs early, but gives no relief and there is constant nausea and eructation. The material vomited at first consists of the contents of the stomach together with bile. There is usually complete constipation from the first, though sometimes the contents of the lower bowel may be evacuated ; neither the solid nor the gaseous contents of the intestine pass on, and one peculiarity of the constipation is that it is at once evident to the patient himself. In ordinary cases of constipation the patient only gradually becomes aware of the fact that the bowels are not acting ; but here from a very early stage he feels that there is some difficulty in the onward passage of flatus







































forty-eight hours. Another plan is to fix a Paul's tube into the opening in the bowel which was made to evacuate the contents of the loop and fasten it to the parietes, thus making a colostomy opening (see Fig. 129). It is also advisable to stitch the meso-sigmoid to the abdominal wall or to the iliac fascia. The stitches must not be introduced through the bowel wall as they might tear through and lead to perforation ; they must be passed through the outer layer of the meso-sigmoid without constricting the blood-vessels. If this does not suffice, the loop may be moored by the appendices epiploicæ.

Should it be impossible to untwist the volvulus, or should the mass be gangrenous, the outlook is exceedingly grave, for the surgeon has no alternative but to resect the entire mass—a procedure which is generally more severe than the patient can stand. To form an artificial anus in the loop does no good, because the affection is left untouched and the gangrene will proceed uninterruptedly. When, however, the patient cannot possibly stand the necessary resection, the best that can be done is to make an artificial anus both in the involved loop and in the colon above by the aid of Paul's tubes (*vide supra*). This, however, is very unlikely to succeed, and should only be done when it is impossible to do anything else.





















the rectum, or even by seeing it protruding from the anus; rectal examination should never be omitted.

**TREATMENT.—Palliative.**—If it is decided to postpone operation, either because the symptoms are not urgent and the surgeon is not sure of their cause, or because the patient wishes to wait before an exploration is undertaken, *careful dieting* is very important. Only fluids—peptonised milk, meat-juice, etc.—should be given by the mouth, and this may be reinforced by rectal feeding, except in cases in which there is marked tenesmus. Simple enemata may be employed in order to promote the action of the bowels, but no strong purgatives should be administered; small doses of *salines* may, however, be given. If there is much pain, *opium* or opium and belladonna may be used. But as soon as it has been decided that the case is one of chronic intussusception, operative measures should be undertaken.

**Operative.**—As a rule there is no firm adhesion between the intussusceptum and the intussusciens in these cases, and much of the invagination may be undone by pressure. The apex of the intussusception, however, may not come out, and either Barker's operation or resection of bowel, including the irreducible portion of the intussusceptum, must be undertaken, followed by lateral anastomosis or end-to-end union of the divided portions of the bowel. If the affected part is the sigmoid and a large portion has to be excised owing to the presence of a malignant growth, it may be better not to attempt to bring the ends together, as the tension on the stitches may be so great that they may cut out, and fatal peritonitis result. Under such circumstances the lower end may be sewn up and a colostomy established at the upper end, or both ends may be sewn up and an anastomosis made between the lower end of the ileum or the transverse colon and the lower segment.

## OBSTRUCTION DUE TO ADHESIONS AFTER LAPAROTOMY.

Intestinal obstruction occurring after abdominal operations, particularly in the pelvis, is an accident that must always be borne in mind. These cases are intermediate between the acute and chronic forms as regards the acuteness and severity of the symptoms, but really belong to the acute form as regards their pathology, and they constitute a true intermediate group between the two. The course of events in this form of obstruction is as follows: for the first day or two after the original operation the patient apparently goes on well, but then begins to suffer from flatulence, distension, sickness, and frequent colicky pains. At first the bowels may act and flatus may be passed, especially after the employment of enemata; but the obstruction rapidly increases and ultimately becomes complete, and the patient will die unless relief is obtained. The condition is usually at its worst about five or six days



**Operative.**—Should the symptoms increase in intensity or the obstruction become absolute, the incision already made should be reopened, and the patient is placed in such a position that the intestines will fall away from the site of adhesion—*e.g.* in the Trendelenburg position after pelvic operations. The edges of the wound should be widely retracted, because it is most important to see exactly what one is doing, especially in order to avoid tearing the softened bowel wall while detaching it. The intestines are carefully kept out of the way with abdominal cloths which are also packed round the operation area in case the bowel wall is damaged. As a rule, separation of the adherent bowel is easily effected if the abdomen is opened within the first few days after the original operation, but it must be done carefully and methodically; above all, the gut must not be pulled upon, for it is not only adherent but softened by the inflammatory changes, and will tear readily. The best way of effecting the separation is to press the stump to which the bowel is adherent away from the latter with a swab, and to insinuate the finger through the lymph gradually. It is much safer to work with the finger alone or with abdominal pads than with any form of blunt dissector or metal instrument. The bowel wall is so soft and friable that instruments are apt to perforate it however carefully they are handled. A perforation of this nature, moreover, is not easy to suture, owing to the softness and want of pliability of the muscular wall.

When the coil has been detached, it should be inspected to see if it has been damaged and if a permanent kink has been formed. When the operation has been done quite early, this will not be the case, and the bowel can be replaced safely. When, however, a longer period has elapsed, a kink may be present, which is not rectified by detachment of the bowel, and resection of the affected part of the bowel may then be necessary; the condition of the patient, however, may negative the performance of so severe an operation and the surgeon may have to bring the loop of intestine into the wound and insert a Paul's tube (see p. 343), leaving the repair of the enterostomy opening to a subsequent date. Before closing the abdominal wound all possible steps must be taken to avoid a recurrence of the obstruction, and this is very likely to happen if a raw surface covered with lymph is left. If possible, therefore, the peritoneum on each side of the stump should be detached and brought over the raw surface, as ought to have been done in the first instance. The areas in question may be smeared with sterilised vaseline or pure paraffin in order to promote movement of one portion upon the other. The abdomen is then closed, and the after-treatment is the same as for acute obstruction (see p. 344).









been stirred, and then taking X-ray photographs of the abdomen at intervals of a few hours, until the bismuth has reached the rectum. If there is a stricture or kink, the bismuth accumulates above it and the degree of contraction may be indicated by the length of time it takes for the material to pass through. Similar investigations should also be made by injecting a bismuth emulsion up the rectum, and then examining the abdomen by the screen or taking a radiogram; this will show whether the bismuth has passed freely upwards or has been arrested at any point. As a rule it is easy to force the bismuth up as high as the middle of the transverse colon when there is no stricture.

Lastly an exploratory operation may be performed before complete obstruction has set in so as to determine the existence and the situation of the obstruction and to deal with it at an early stage while the condition may still be remediable.

### CHRONIC OBSTRUCTION FROM CAUSES OUTSIDE THE BOWEL.

Assuming that these various investigations have been made, we shall proceed to consider the treatment of the different conditions which may be present according as the obstruction is incomplete or complete.

#### CHRONIC OBSTRUCTION CAUSED BY TUMOURS.

It is not uncommon for the intestine to be compressed by a tumour external to it—for example, the sigmoid flexure or rectum may be pressed upon by uterine or ovarian tumours to such an extent that intestinal obstruction results.

**TREATMENT.**—The obvious treatment is to remove the obstructing cause, but this is not always possible, either because the tumour is too firmly fixed or because the patient's condition will not allow of it. If the tumour is a simple ovarian or uterine growth, its removal may present no difficulties; if it is malignant, it may not merely press upon the intestine, but may involve its wall, and be irremovable. When the tumour is inoperable, or the patient is so ill from obstruction that removal is out of the question, it is best to establish an artificial anus, and then, if removal of the tumour is possible, to proceed to excise it, and close the artificial anus when the patient has recovered from the effects of the obstruction.

#### CHRONIC OBSTRUCTION CAUSED BY ADHESIONS.

The other extrinsic cause of chronic intestinal obstruction is adhesions following peritonitis—usually tuberculous. The intestinal coils become matted together in this affection, or the omentum becomes thickened and













its long axis transverse to that of the bowel ; it may encircle the bowel more or less completely and lead to an annular constriction. The ulceration may pass deeply into the sub-mucous and muscular coats, in which case peritonitis occurs outside, and the contraction of the exudation increases the narrowing still further. The affection is often accompanied by tuberculous peritonitis (see Chap. XXVIII.). *Typhoid ulcers* and *acute duodenal ulcers* rarely give rise to stricture. Very severe stricture may follow the spontaneous cure of an *intussusception* by sloughing.

*Dysenteric ulcers* commonly lead to a certain amount of stricture, but as they occur in the large intestine, they seldom produce so much narrowing as to cause prominent symptoms of obstruction ; when they do so, they are generally situated in the sigmoid flexure or towards the upper part of the rectum. *Ulcerative colitis* is a very fatal disease, although it may also occasionally be the cause of constriction. *Syphilitic ulceration*, leading to stricture, is very rare, except at the lower part of the rectum ; this is dealt with in Chap. XXXVII.

#### CHRONIC OBSTRUCTION DUE TO MALIGNANT STRICTURE.

New growths causing stricture of the bowel are practically always malignant and are adeno-carcinomata. In the great majority of cases the growth is primary in the bowel itself, and springs from the Lieberkühnian follicles ; it soon infiltrates the sub-mucous tissue, and finally penetrates to the muscular and peritoneal coats. The wall of the bowel, however, may sometimes be involved secondarily—chiefly from direct continuity—by malignant disease of other parts, such as the uterus, prostate, ovaries, or stomach. Malignant growths are by far the most common cause of stricture of the large intestine, and, after forty or fifty years of age are almost the only ones. In the small intestine non-malignant strictures seem to be more common than malignant ones.

Carcinoma of the bowel forms a hard, raised nodule projecting from the mucous surface of the intestine. This nodule soon ulcerates and the disease spreads around the bowel until a characteristic constriction is produced—namely, a sort of diaphragm of growth across the lumen presenting towards the centre a ragged ulcerated aperture, which is often very narrow. The amount of growth present in proportion to the constriction produced is very variable ; sometimes the stricture is extremely tight like a ring round the bowel, while the amount of growth is very small indeed ; sometimes there may be extensive growth, but no great blocking of the canal. The disease affects the glands in the neighbourhood—in this instance, in the mesentery—and leads to secondary growths, especially in the liver. It is an important point that the disease in the glands and in the liver usually grows more slowly than the primary disease in the bowel, and when the latter has been removed, a considerable time may elapse before the secondary growths cause death. Sometimes



relieve the symptoms; the earlier the diagnosis is made the greater will be the chance of removing a growth.

**Resection of a stricture.**—The *incision* will vary with the situation of the disease. If a tumour is felt in the region of the cæcum, the ascending or the descending colon, or the sigmoid flexure, an incision over the seat of the disease will no doubt give most convenient access; on the other hand, when the situation of the disease is unknown or can only be guessed at from the symptoms, the abdomen should be opened in the middle line. Except in the case of the ascending and descending colon, most tumours of the intestine can be removed through a median incision.

With regard to the *excision of the stricture* there is little to add to what has been said on p. 324. End-to-end anastomosis is best performed by simple suture, but most surgeons prefer to close the ends of the bowel and perform a lateral anastomosis; this is especially the case in the large intestine. In removing a tumour from the small intestine a wedge must be taken out of the mesentery, and this should enclose all the enlarged glands, if possible; if this is not done, the glands and fat must be removed, taking care not to interfere with the blood-supply of the bowel.

It is an open question whether the surgeon should excise a local growth in the intestine, even though it is readily removable, when it is accompanied by a glandular infection that negatives any hope of eradicating the disease. In our opinion this should be done, for the following reasons: In the first place, the patient, if not actually suffering from complete obstruction, must inevitably do so before long, and will need an operation for the relief of that, notwithstanding the existence of secondary growths; therefore an operation which restores the lumen of the canal while the patient's condition is good is the best thing that can be done, quite apart from the question of whether the disease is eradicated or not. In the second place, the secondary growths in the glands and the liver usually progress much more slowly than does the disease in the bowel, and, apart from the comfort and prolongation of life afforded by relief of the obstruction, life may be further prolonged by removing the rapidly growing intestinal disease.

The details of the operations will vary with the seat of the disease. In the case of a simple stricture of the small intestine or a freely movable malignant growth there is little difficulty. As there is often a marked difference in the calibre of the bowel above and below the obstruction lateral anastomosis is, as a rule, the most satisfactory method of uniting the divided ends.

The chief difficulty in excising malignant tumours of the bowel occurs when they affect the more fixed parts of the intestine, parts not completely surrounded by peritoneum, or parts such as the hepatic and splenic flexures of the colon, which are difficult to get at. In the case of







opening and the stricture as possible. Another reason for this is the possibility of partial or even complete internal strangulation through the loop thus formed. Further, in bringing the two portions of the intestine together there must be no stretching of the intestine and the two portions should lie easily together without kinking. In the case of a cancerous stricture, where the anastomosis must not be made too near the growth, it is best, in order to avoid a long loop, to divide the bowel above the loop, sew up both ends, and then unite the proximal portion with the distal at some distance below the growth.

The actual steps of the short-circuit operation are the same as those described for gastro-jejunostomy and for lateral anastomosis of the intestine (see pp. 265, 324).

**Artificial anus.**—An artificial anus should only be made when an intestinal anastomosis is impossible owing to the situation or extent of the disease. In the small intestine, an artificial anus must never be made except when nothing else can be done; even at a considerable risk to the patient a short-circuit operation should be performed if it is impossible to excise the stricture. An artificial anus in the small intestine, if high up, produces profound malnutrition, and, moreover, the intestinal contents are extremely irritating and give rise to an eczematous condition of the skin of the abdomen which is most distressing to the patient. When the skin becomes much inflamed the following prescription is of value :—

|                     |   |   |   |         |
|---------------------|---|---|---|---------|
| R. Bismuthi subnit. | ) |   |   | āā ʒss. |
| Zinci oxidi .       | ) | . | . |         |
| Ol. eucalypt.       | . | . | . | ℥xx.    |
| Ol. ricini .        | . | . | . | ad ʒij. |
| Misce.              |   |   |   |         |

This is rubbed over the skin around the opening at each dressing. When the surgeon is forced to make an intestinal fistula, the disadvantages may be to some extent minimised by employing the method described on p. 308.

**2. When the obstruction is complete.**—The foregoing remarks refer to incomplete intestinal obstruction in which the patient's condition is good and there is no urgency. Unfortunately, the surgeon is more frequently called to these cases when the obstruction has become complete and the patient's condition is therefore bad. Although physicians—who generally see these cases first—are becoming more alive to the advantage of early surgical treatment, many are still apt to go on treating them in the vain hope that the obstruction may be due to faecal accumulation, and the patient is often almost moribund before a surgeon is called in.

In complete obstruction, the diagnosis of the seat of the obstruction, as well as of its nature, assumes the highest importance. In incomplete cases, even although the seat of obstruction may not be accurately





























given in a pill combined with a little rhubarb and nux vomica, as in the following prescription :

|                        |   |   |   |   |   |   |                     |
|------------------------|---|---|---|---|---|---|---------------------|
| R Pulv. rhei.          | . | . | . | . | . | . | gr. j.              |
| Ext. belladonn. virid. | . | . | . | . | . | . | gr. $\frac{1}{4}$ . |
| Ext. nucis vom.        | . | . | . | . | . | . | gr. $\frac{1}{2}$ . |
| Misce. Ft. pil. T.d.s. |   |   |   |   |   |   |                     |

Salol (ten grains in cachets three times a day) may be employed in the hope of diminishing the decomposition of the intestinal contents and thus lessening the poisoning of the patient. In the more chronic cases abdominal massage is of value. The diet must also be regulated ; substances leaving an insoluble residue should be avoided and the patient encouraged to drink plenty of fluid and take exercise.

It is rarely necessary to consider the question of operation in this condition, except when a malignant growth complicates the fæcal impaction, but when there is an inveterate tendency to chronic accumulation of fæces in the large intestine the question of an ileo-sigmoid anastomosis or even excision of the colon may be considered.

## CHAPTER XXV.

### INFLAMMATORY AFFECTIONS OF THE INTESTINES.

THE inflammatory affections of the intestine may affect the mucous membrane or the appendages connected with the intestine (appendix vermiformis, Meckel's diverticulum, appendices epiploicæ, or diverticula from the intestine), or the peritoneal coat of the bowel (septic and tuberculous peritonitis).

### AFFECTIONS OF THE MUCOUS MEMBRANE.

The inflammatory affections of the mucous membrane do not often come under the care of the surgeon, but his aid may be sought under certain circumstances: for example, in membranous colitis, in acute ulcerative colitis, in certain cases of dysenteric ulceration, in perforation of ulcers (*e.g.* peptic or typhoid ulcers), and in tuberculous or syphilitic ulcers.

#### MEMBRANOUS COLITIS.

This condition most frequently occurs in women, and is commonly associated with constipation. It often occurs in connection with enteroptosis. The most characteristic symptom is the passage of pieces of membranous material and mucus along with the fæces; sometimes casts of portions of the canal may be passed. The patients are usually emaciated, complain of pain (often burning and sometimes colicky), intestinal movements may be seen, and the general health is bad. The patients frequently pass into a neurasthenic condition.

**TREATMENT.**—The *medical treatment* consists in attending to the evacuation of the bowels, and castor oil or pure paraffin given daily are the drugs on which most reliance is placed; in lavage of the intestine — best obtained by a visit to Plombières, Buxton, or Harrogate; in abdominal massage and exercises; in the use of an abdominal support in cases in which enteroptosis is present (see Chap. XXXII.); and in attention



















In the secondary stage an acute catarrhal enteritis may occur, and in the tertiary stage gummatous ulcers have been met with.

Syphilitic strictures occur both in hereditary and acquired syphilis, most commonly in the upper part of the small intestine, but also lower down and occasionally in the colon. They are generally multiple and surround the intestine like tuberculous ulcers. With the exception of the catarrhal enteritis in the secondary stage, the diagnosis of syphilitic ulceration of the intestine is extremely difficult and often impossible. The symptoms closely resemble those of tuberculous ulceration of the intestine, and if they occur in a patient beyond thirty-five years of age and are accompanied by other syphilitic lesions, and the Wasserman reaction is positive, and, further, if they have existed for a considerable time and no definite symptoms of any other condition such as malignant or tuberculous disease are present, syphilis may be suspected. The *treatment* will be that of syphilis, and operative intervention will only be required if strictures have formed.

## CHAPTER XXVI.

### APPENDICITIS.

THE question whether typhlitis or perityphlitis exists apart from appendicitis is still discussed, but there is no doubt that the diseases formerly classed as typhlitis and perityphlitis were, as a rule, cases of appendicitis, and, although a localised typhlitis or perityphlitis may occur from steroral or other forms of ulceration, the cases in which severe symptoms are produced, apart from appendicitis, are very rare.

*Anatomy.*—The vermiform appendix springs from the postero-internal aspect of the cæcum, a little below the ileo-cæcal junction, and is readily found by tracing down the anterior longitudinal muscular band of the large intestine. The root of the appendix is fairly constant in situation and corresponds on the abdominal wall to the spot known clinically as 'McBurney's point'; this is at the junction of the outer and middle thirds of a line drawn from the umbilicus to the anterior superior iliac spine. The process is usually from three to four inches long in adults; it may, however, be considerably longer, and an appendix nine inches long has been recorded. In the infant it is approximately straight and relatively longer than in the adult, while in old age it atrophies concurrently with the other lymphatic structures. The mesentery of the appendix ('meso-appendix') is triangular or sickle shaped, the blood-vessels running along its free border. The arterial supply of the appendix is derived from a branch of the ileo-colic artery which passes behind the termination of the ileum and runs along the free border of the meso-appendix to the tip of the organ, giving off branches to the appendix in its course. From one of its earliest branches, there is a recurrent twig of fair size which anastomoses with the arteries of the cæcum. This probably accounts for the fact that the proximal portion of the appendix may be living although the distal portion is gangrenous.

As the appendix grows it tends to become curled upon itself. Its position varies; but for clinical purposes, three positions or rather sets of positions may be described. It most commonly lies to the inner side













definite rigidity of the muscles over the right iliac fossa, and in some cases a swelling may be felt when this rigidity can be overcome, *e.g.*, by deep breathing. The abdomen is more or less tender at first, but the tenderness soon becomes localised ; indeed, in many cases the whole tender area can be covered by a florin. On examining *per rectum*, a tender spot can sometimes be detected high up and to the right side.

These symptoms point to an appendicitis with extension of the inflammation to the peritoneal surface, both of the process itself and of the intestine in the vicinity ; were the parts exposed, the appendix would be found to be swollen and injected, and it and the various coils of intestine around it would often be more or less glued together by lymph. These symptoms generally indicate inflammation in connection with a concretion in the appendix or with a kink or stricture ; they may, however, indicate an actual perforation, although the symptoms are then usually more severe. The condition generally ends in resolution, but may go on to suppuration.

When resolution occurs, the temperature begins to fall about the second day and generally reaches the normal at the end of the week, and there it should remain if no suppuration has occurred. The rigidity of the abdomen soon diminishes, and the fullness—which is not a hard swelling as it is when suppuration is occurring—rapidly decreases ; in an ordinary attack the patient ought to be well at the end of a week or ten days.

These cases, however, are very prone to relapse, and the relapse may occur either after a long interval of complete health, or the patient may hardly have recovered from one attack before another occurs. These relapses indicate the presence of some of the permanent changes to which we have already referred (see p. 401). Early and frequent relapses usually indicate the presence of a concretion, or inflammation and ulceration of the mucous membrane beyond a kink or stricture. When long intervals occur between the attacks, obliterative appendicitis is not uncommonly found ; this, however, may be complicated with distension and inflammation of the process beyond a stricture.

In some cases the symptoms are not so acute, but the relapses are very frequent. The pain is then often of an acute colicky character lasting at most only a few hours, but not accompanied by any marked swelling, any distinct peritonitis, or much fever ; the patient may be confined to bed for weeks with recurrent attacks of this pain every two or three days. This condition is termed '*appendicular colic*,' and often indicates a concretion or a stricture with distension of the appendix beyond. At any time this appendicular colic may pass into the more serious acute appendicitis.

In a third group of cases the symptoms are much more severe. The onset is more or less sudden, and there is usually severe vomiting and intense pain at first. In some cases there may be a definite rigor and the































## TREATMENT IN THE ACUTE STAGE.

The view is gaining ground that the wisest course is to remove the appendix in all cases without delay as soon as appendicitis is diagnosed, and in our opinion if this course were generally adopted many severe attacks would be avoided and the death-rate diminished. The symptoms of acute appendicitis are so deceptive that it is often impossible to say whether the attack is to be a mild or a severe one. On p. 404 we have indicated some points which may help in coming to a conclusion, and especially those which indicate a grave state of matters. In the latter set of cases there should be no hesitation in urging operation as early as possible ; but even in cases which begin mildly, although many of them recover, yet they may change their character, and complications may ensue ; and as the operation early in the attack is in the great majority of cases a clean one, operation immediately the diagnosis is made is the wisest course.

When, however, the disease is established and has lasted for some days before the surgeon is called in, opinions differ as to the period at which the operation should be performed, some advising delay in the hope that the inflammation may subside, or that an abscess, if forming, may become well localised, others advising immediate operation. If the case is a mild one and the symptoms are rapidly improving, delay is permissible and appendicectomy may be deferred until the attack has passed off, but in all other cases we believe that immediate operation is the wiser course.

Those who delay operation when it is fairly obvious that pus is present do so in the hope that the abscess may become adherent to the abdominal wall, and that it may be evacuated and drained without opening the general peritoneal cavity. But it must be borne in mind that the swelling in which the appendix lies and in which the pus forms, is situated towards the deeper part of the abdomen in the great majority of cases and may not—except in the cases in which the pus is behind the ascending colon—become adherent to the abdominal wall for some time, if at all, and in the meantime the patient is subject to all the risks referred to on p. 430. Further, when the abscess is large, the surgeon must in many cases be content with opening it, and it is seldom that the appendix can be removed at the same time without defeating the object of the delay—that is to say, without opening the general peritoneal cavity. The removal of the appendix is, however, a very important matter in these cases. If the abscess is merely opened, it may not heal until the appendix has been taken away, and even if it does, the patient is liable to further attacks of appendicitis ; thus appendicectomy will be required in either case at a later period. For these reasons, therefore, we cannot agree with the policy of delay.

















bowels to act. The sleeplessness is often most distressing and persists for several days in spite of all sorts of narcotics.

At first nothing should be given by the mouth, except sips of hot water, and in any case it is better not to force nutriment for at least twenty-four hours. After that he may have beef tea, chicken broth, milk, and barley water, albumen water, raw-meat juice, tea with biscuits or toast. As soon as the bowels have acted, he can have semi-solid food, and may have ordinary diet in a week or ten days.

*Local treatment.*—The outer dressing should be changed daily or oftener if it becomes very foul, as is not uncommonly the case, but there should be no meddling with the packing or the tubes and no syringing at first. On the second day, very gentle traction may be made to see if any of the packing will come away, but no serious attempt should be made to remove it till the third day ; even then, only a small portion of it will be got away, as a rule. In adults the gauze can generally be removed without an anæsthetic, but in children it is advisable to administer one. The removal must be done with gentleness and patience, so as not to damage the adhesions, and will sometimes take an hour or more. If the gauze is pulled out quickly and forcibly, the adhesions may be broken down and the whole aim of the packing undone ; indeed, it has happened under such circumstances that bowel has come out of the wound and has of course become soiled. The removal of the gauze is much aided by injecting peroxide of hydrogen (10 vols.) into the tube and on the gauze ; it bubbles very much and loosens the gauze. In the first place only the interior gauze should be dealt with by pulling on a small piece at a time, then taking a fresh piece and irrigating freely with the peroxide of hydrogen, this portion will come away fairly easily, leaving the tube and the gauze envelope still to be removed. It takes some time to remove the interior mass of gauze, and if it is still firmly adherent it is well to leave the final removal until next day ; if not it may be removed at once. In any case the next thing to do is to take out the drainage tube, which comes out quite easily, and then the removal of the remainder of the gauze is proceeded with. A fresh drainage tube should be ready for insertion at once, otherwise the sides of the canal may fall together and it may be difficult to get the tube down to the bottom of the wound. Some gauze should be lightly packed into the upper part of the wound for some days, so as to prevent the intestines bulging out between the edges and interfering with their proper closure. Subsequently the wound is syringed out with peroxide of hydrogen every day until it becomes odourless, when it is best to leave off syringing altogether. The drainage tube should only be shortened as it is pushed out, and the cavity is thus made to heal from the bottom. If it is left out too soon, accumulation of pus takes place and the wound has to be re-opened, and thus its ultimate closure is delayed. An average time for the healing of these cases is about five







this passes off and all that is noticed subsequently is that there is a little difficulty in getting the bowels to act ; in others, it persists and ends fatally unless promptly remedied. The symptoms do not differ from those described in Chap. XXII. If the bowels become completely obstructed after an operation for suppurative appendicitis and the patient becomes distended and begins to vomit, it may be assumed that a kink is present.

*Treatment.*—It is usually better to make a separate incision in the middle line in order to deal with this condition. Before doing this, the original wound should be packed and carefully covered up with a piece of gauze, wet with 1 in 2000 perchloride solution ; a piece of mackintosh should be applied over it, its inner border being stitched to the skin external to the proposed site of the fresh incision. The distended bowel is sought for and traced down to the point at which it is adherent. Sometimes it is possible to detach this without breaking into the infected area ; in other cases this will not be possible, and it is then advisable not to attempt to detach it, but either to perform a lateral anastomosis, short-circuiting the kink, or to open the bowel above it. These procedures are carried out in the manner described in Chap. XXII. When an anastomosis is performed, the second wound can usually be closed throughout the greater part of its extent, but if any detachment of the kink has taken place it may be safer to put in a drainage tube, and to sew up the rest of the wound with through-and-through sutures so as to minimise the effect of a subsequent sepsis. If the patient is in a very bad condition when the operation is performed, and especially if the distension has lasted for some time, the anastomosis will probably not act properly, and the only thing to be done is to bring forward a coil of intestine above the kink, open it, introduce a Paul's tube and establish a temporary fæcal fistula. This can be closed after recovery has taken place (see Chap. XXXI.).

**Residual abscess.**—In some cases the symptoms continue after the operation, and this is often due to the presence of another abscess. In other cases an increase of the symptoms is observed after the temperature and pulse have settled almost to normal, and a careful search should then be made for an abscess. This may be merely a loculus of pus in the neighbourhood of the operation wound, into which it ultimately ruptures, or there may be an abscess in the pelvis or beneath the diaphragm. The directions in which the pus may spread are referred to on p. 403. These abscesses may be completely shut off from the original wound or they may communicate with it by a narrow canal. In the latter case the discharge of pus is often profuse and the surgeon may be led to think that the symptoms are due to general septic absorption rather than to a localised abscess, the discharge being so copious that it is difficult to realise that sufficient drainage has not been obtained. It must be borne in mind, however, that a badly drained









the sinus shows no sign of healing after three months, the externa opening may be dilated very cautiously by a laminaria tent (because there are often comparatively few adhesions around it), and the cavity searched for a foreign body with a probe, a pair of forceps, or (if large enough) with the finger ; a small scoop may also be introduced and the cavity gently cleared out. A large drainage tube is then introduced and the wound is dressed daily. It is very important not to be impatient in these cases. As long as the discharge is slight, there is always a probability of healing taking place, and we have seen these sinuses heal after two or three years. If, however, there are recurrent attacks of inflammation and accumulation of pus, there is nothing for it but to open up the sinus, even though that involves opening the peritoneal cavity. Indeed, in most cases it is best to open the peritoneum, pack off the intestines, and expose the bowel and the lower end of the sinus, and open up the sinus thoroughly. The wound must be packed and drained after such an operation just as after removal of an appendix in the acute stage (see p. 426).

If the appendix has not been removed, the probability of healing of the sinus without further operation is not good, and the question of removing the appendix in spite of the presence of a septic sinus must be considered. As a matter of experience it is found that there is no great risk in removing the appendix with proper precautions unless there is free suppuration from the sinus. When there is free suppuration, virulent pyogenic cocci are present, but in many cases of persistent sinus there is only a slight serous discharge which is probably only feebly infective.

The best way of performing the operation is not to open up the sinus, but to make an independent incision. The sinus should be gently scraped first of all and packed with a little gauze, partly to define it and partly to prevent any septic material from running out into the wound. A separate incision is then made in the immediate vicinity to open the general peritoneal cavity and get at the appendix from within. The amount of adhesions met with will of course vary very much, and the surgeon must work from the cæcum and the ileo-cæcal valve to the appendix itself which will usually form part of the wall of the sinus. If it is firmly adherent, the simplest plan is to expose the root of the appendix and divide the peritoneum over it, and then gradually separate the peritoneum from the appendix, ligature the latter at the base, cut it off and bury it. This avoids all risk of injuring the intestine, and it is of course the mucous membrane which gives rise to the trouble in healing. If the appendix is not very adherent, it may be separated and removed in the ordinary way. The sinus is now thoroughly cleared out and the abdominal incision is extended into the orifice, which is then packed with gauze, after which the upper part of the wound is closed with stitches. In the course of twenty-four hours the peritoneal cavity is well shut off, the gauze packing is removed, and there is usually no delay in healing.



pylephlebitis, or peri-renal abscess, may be found to be the cause. The symptoms may, however, not be due to trouble in the abdomen, but in the thorax; thus pneumonia or pleurisy sometimes begins with vomiting, epigastric pain and tenderness, and symptoms resembling subphrenic abscess.

It may be useful if we consider the significance of the chief symptoms which arise, and the indications for immediate operation. The symptoms may differ according as they are observed at the commencement of the trouble or at a later period.

**Significance of the chief early symptoms.—Pain.**—The character and situation of the pain are of importance. In perforations of the stomach, intestine, or gall-bladder, the pain is severe, constant, and of a burning character. At first it is limited to the seat of rupture, though it soon spreads over the abdomen. In rupture of cysts, the pain is more diffuse from the first and not so severe, but it is most marked over the seat of rupture. In perforation of the appendix the severity of the pain varies much, but it may be severe and located in the appendix region; usually, however, the fixed pain in that region is associated with, or preceded by, colicky pains in the neighbourhood of the umbilicus. In other cases appendicitis commences with colicky pains at or above the umbilicus, and pain in the appendix region develops later. In internal strangulations, and other obstructive conditions, there may be pain at the site of the lesion, but the chief complaint is severe recurring colic referred to the umbilical region. Gall-stone pain is epigastric, passing through to the back and shoulder, and very severe. Renal or ureteral pain is severe and somewhat spasmodic, and shoots downwards to the scrotum and inner side of the thigh.

*Tenderness* is not present in all cases of abdominal pain, and may differ according as the examination is made by pressure or percussion. It is marked from the first in cases of inflammation or rupture of a viscus, and is generally greater on percussion than on pressure. In cases of obstruction, on the other hand, the pain may be relieved by pressure; this may also be the case in biliary or renal colic. In some cases the whole abdomen may be tender, but the seat of the lesion is generally indicated by an area of extra tenderness. Unless general peritonitis sets in, the tenderness diminishes as time goes on, except over the seat of the disease, where it increases.

*Abdominal rigidity* is a very prominent symptom in many of these conditions. It is most marked over the seat of the disease and may be limited to it, but in the early stage of rupture or inflammation it is general over the abdomen. In localised inflammations it—like the tenderness—diminishes, except over the area of the disease. In bad cases of peritonitis gives place to distension of the abdomen; if the abdomen remains rigid all over, it points to rupture of a viscus, or the early stage of general peritonitis or strangulation.



due to some inflammatory condition—such as peritonitis, appendicitis, cholecystitis, or salpingitis ; if the temperature rises soon after being depressed at first, there is usually some perforation. The temperature is not elevated in internal strangulation unless gangrene or peritonitis sets in. The question of the temperature, however, is to some extent of secondary importance, and must be weighed with the other symptoms. It may be elevated in other conditions—for example, in some cases of renal calculus—and it may also rise unduly high in patients who have had malaria.

The presence of *free gas* in the abdomen, as indicated by obliteration of the liver dullness while the abdomen is still retracted and rigid, or at any rate not distended, is a sign of perforation of the alimentary canal. This should also be borne in mind in operating, and if gas escapes on opening the peritoneum, attention must always be directed to the stomach or intestinal tract and the perforation searched for.

The *general aspect of the patient* is usually a good indication of the gravity of the condition. In internal strangulation or rupture of the stomach, the patient is pale, with the typical abdominal face, and lies on his back with his knees drawn up. In appendicitis with perforation the patient does not feel very ill at first, but becomes worse later ; in gangrenous appendicitis he is ill from an early stage. In gall-stones or renal calculi, the patient is restless, doubled up, presses on his abdomen, and does not have the typical greyish abdominal face.

Some assistance may also be obtained from the *previous history*. Thus, there may be a history of indigestion and epigastric pain after food, or of hæmatemesis, indicating an ulcer of the stomach, or of previous attacks of appendicitis, or of renal or biliary colic. Such a history may be of great assistance, but the absence of it does not preclude these affections, for it may be a first attack. A history of old peritonitis may strengthen the diagnosis when the symptoms point to internal strangulation. The history of events preceding the attack is of importance—such as diarrhœa, constipation, violent exertion, or a large meal. *Malaise*, preceding the acute onset, usually indicates an inflammatory attack—such as appendicitis—rather than a sudden strangulation ; premonitory symptoms—such as dyspepsia—may also appear in gall-stone colic.

**Significance of symptoms arising later.**—These early symptoms alter, and other symptoms appear as time goes on and may aid the diagnosis and determine the question of surgical interference. For example, the *spreading of the pain and tenderness over the abdomen* indicates a grave lesion and the development of general peritonitis, while the localisation of the pain to one spot or region indicates a shutting off of the inflammatory action and a much more favourable condition.

*Persistence of colicky pains* is another important indication ; if they persist, the probability of strangulation is increased, whereas in appendicitis, for example, though colic may be very marked at the beginning





confusion. Inflammatory conditions, such as appendicitis, although at first perhaps accompanied by diarrhoea, are also usually marked by complete arrest of the passage of fæces and gas, but even then it is often possible to get away some gas with a long tube or with enemata.

*The character of the tongue* is also of importance. In bad septic conditions—such as gangrenous appendicitis or general peritonitis—the tongue becomes brown and dry, while in obstruction it remains white and moist until near the end.

**Diagnosis.**—The symptoms often overlap very much, and there are so many exceptional conditions that an accurate diagnosis may be impossible, especially in the early stage when, from the point of view of surgical treatment, it is most important. The presence or absence of symptoms indicating involvement of particular organs will help in the diagnosis.

Take for example, acute affections in connection with the kidney. Renal and ureteral colic are very typical. The excruciating paroxysms of pain, not limited to the back but shooting down into the thigh and testicle, frequent and scanty micturition, blood in the urine, and the absence of intestinal colic and abdominal rigidity, are sufficiently characteristic. But even in renal colic the symptoms may not be nearly so acute or typical, and the difficulty of distinguishing between appendicitis and renal or ureteral colic, when the symptoms are not severe, is sometimes considerable, and mistakes in diagnosis have been repeatedly made; we need not, however, go into this subject here, because we are only dealing with cases of the most acute type. The condition of intermittent hydronephrosis is also sometimes confusing. Here the urine becomes temporarily dammed back and the pelvis of the kidney swells up rapidly; the patient is usually seized with severe pain and vomiting, but the pain is definitely located in the loin and side; colicky pains are absent, there is tenderness, and a distinct swelling may often be detected, which is much larger and better defined and develops much earlier than that in appendicitis or cholecystitis; there is no elevation of temperature. Other acute renal conditions—such as peri-renal abscess—may also cause some difficulty, but are generally fairly easily recognised by the position of the pain and the absence of signs pointing to other possible conditions. Abscess forming after duodenal rupture is probably the most difficult condition to distinguish from peri-renal abscess in the later stages.

Gall-stone colic is also fairly definite, the violent epigastric pain shooting through to the back and shoulders, doubling the patient up and relieved by pressure, and the absence of pyrexia, being generally very characteristic. It is in the less acute cases that the difficulty arises.

When the alimentary canal is apparently involved, an important point is whether the lesion is of inflammatory or non-inflammatory origin.



## CHAPTER XXVIII.

### PERITONITIS : PERITONEAL CYSTS : ASCITES.

INFLAMMATION of the peritoneum may be acute or chronic. The acute forms are usually associated with infection of the peritoneal cavity by pyogenic organisms, and practically always end in suppuration which may be diffuse or localised. The chronic forms may occur in connection with tuberculosis, ulcers of the intestine, echinococcus cysts, diverticula from the bowel, new growths, and so forth.

### LOCALISED SUPPURATIVE PERITONITIS.

We have already considered local peritoneal suppuration in speaking of appendicitis, diverticulitis, and ulcer of the stomach and duodenum. It may also occur in connection with infections of the gall-bladder, the Fallopian tubes, and other parts; these conditions are considered under their respective headings. As a rule the perforation of a hollow viscus into a healthy peritoneal cavity leads to a general diffuse peritonitis without any localisation; when it is localised there has usually been a previous plastic peritonitis, which has led to adhesions around the point of perforation. The perforation then takes place into the midst of these adhesions, and a localised abscess may result either around the seat of perforation or in the neighbourhood, or at some distance away by extension of the infection along the lymphatics, as in subphrenic abscess after appendicitis.

### GENERAL SUPPURATIVE PERITONITIS.

From the point of view of treatment, this is one of the most terrible and most disheartening conditions that can be met with. It usually arises in connection with perforation of a viscus such as the stomach, the intestine, or the appendix. It may follow rupture of a localised collection of pus in the Fallopian tubes or elsewhere, perforation of a septic gall-bladder, or extravasation of septic urine; it may follow



Even when they are not treated promptly, the patients may live for several weeks, which is quite a different course from that of acute septic peritonitis. The prognosis in these cases is correspondingly more favourable.

**TREATMENT.**—This should be on the lines suggested for general peritonitis or for a localised abscess. The peritoneum should be opened through the rectus, and the fluid and flakes allowed to flow out. The peritoneal cavity may then be gently irrigated and the loose flakes evacuated, and drainage tubes may be placed in the flanks and down into the pelvis. Vaccine therapy may also be employed, but must be used with great care, because cases have occurred which were going on well after operation, and in which, after a dose of vaccine (possibly too large) the course has changed for the worse and death has occurred.

#### GONOCOCCAL PERITONITIS.

This is most frequent in females in whom the infection occurs through the Fallopian tubes ; it usually remains limited to the pelvis, but may become generalised. While pus is often present in the tubes, suppuration may not occur in the peritoneal cavity, and in some cases the condition may subside without leaving many adhesions. It often begins very acutely, but in a day or two may become subacute or chronic, exacerbations taking place from time to time or complete recovery occurring. The questions of recovery and of the necessity for operation depend mainly on whether pus is present in the Fallopian tubes or not. This is indicated by feeling a swollen or painful tube or tubes *per vaginam* and by the presence of a purulent vaginal discharge, especially if it contains gonococci. When these conditions are present the abdomen should be opened, the Fallopian tube or tubes removed, and, if necessary, drainage of the pelvis provided by perforating the roof of the vagina in the middle line behind the uterus and passing a drainage tube into the vagina ; the anterior wound can then be closed.

#### CHRONIC TUBERCULOUS PERITONITIS.

Tuberculosis is the most common cause of chronic peritonitis. It is usually secondary to tuberculous ulceration of the intestine or tuberculous mesenteric glands. It may also follow tuberculous disease of the female genital organs (especially the Fallopian tubes) and sometimes, though much more rarely, of the vesiculæ seminales in the male. It may occur in connection with a tuberculous pleurisy. Primary tuberculosis of the peritoneum is comparatively rare.

Tuberculous disease of the intestine is said to occur most commonly in the lower part of the ileum, but it is also frequent in the cæcum ; in some cases it may commence in the vermiform appendix.



ting it for the removal of fluid. When the entire abdomen is affected, the adhesions are most marked near the diaphragm. The omentum is early involved ; its layers become matted together and the whole structure becomes thickened and shrunken and, in the advanced stages, forms a sausage-like mass lying more or less transversely about the level of the umbilicus. It is generally adherent to the abdominal wall at this point. The omentum contains numerous tubercles in its substance and scattered over its surface, while the mesentery is thickened and shrunken and drags the small intestine up towards its root, so that, when fluid is present, it generally collects towards the left side of the abdomen. It is seldom that any large quantity of free fluid is present in these cases, but encapsuled collections are not uncommon. The mesenteric glands are also enlarged, though not as a rule cheesy. The spleen is frequently enlarged.

3. In the third group, which is a very grave one, the masses are larger and are undergoing caseation. The mesenteric glands are large and caseous, the omentum is often converted into a caseating mass, and similar masses form in the adhesions which bind the intestines together. The contraction and distortion of the bowel, the shrinking of the mesentery and the other changes mentioned under the second form are much more marked. This condition is usually associated with ulceration of the intestine, which is thinned and may even be perforated in places, while in others several strictures (some of them quite tight) may be present and may cause more or less obstruction. Collections of fluid are not uncommon ; they are usually encapsuled and generally purulent, the pus presenting all the characters of ordinary tuberculous pus. In some cases, however, it is foul and contains the *Bacillus coli communis* either from infection through the intestinal walls or from actual perforation of the intestine. In young children these abscesses are most common near the umbilicus, through which pus may find its way and lead to the formation of a sinus or even a fæcal fistula. As the latter is often high up in the small intestine the child rapidly emaciates.

The above are the chief types of tuberculous peritonitis, but intermediate varieties are met with. The affection may be localised, especially in connection with tuberculous perityphlitis or disease of the Fallopian tubes, and the mass thus formed has frequently been mistaken for a tumour ; in the cæcal region such masses may give rise to more or less complete obstruction.

Apart from these cases the essential trouble may consist of masses of tuberculous glands in the mesentery, some calcareous and some suppurating, without any eruption of tubercles on the peritoneum. Although these cases hardly come under the heading of tuberculous peritonitis proper, it is perhaps best to include them here.

The affection may occur at any age, but it is most frequent between the ages of twenty and thirty-five ; it is common in children, but comparatively rare after thirty-five. Difference of opinion exists as to





intestinal obstruction due to kinking, to bands, or to stricture following ulceration. Perforation may also occur from rupture of an ulcer, or there may be abscess formation, with discharge of pus from the umbilicus and fæcal fistula. The disease is sometimes complicated with phthisis or pleurisy.

The *diagnosis* is not always easy. The affection has to be distinguished from ulcer of the intestine, malignant disease, gastric catarrh, typhoid fever, peritoneal cancer, chronic peritonitis from other causes, and ovarian cysts. The points in favour of tuberculous peritonitis are a family history of tuberculosis, tubercle elsewhere, the presence of localised thickenings in the abdomen, a fairly rapid formation of fluid with no demonstrable cause, a feeling of weight and uneasiness, percussion note changing slowly with alterations in position, a hectic temperature (though sometimes there is little or no fever), albuminuria, and no other demonstrable cause for the ascites.

The *prognosis* is undoubtedly very grave, but much depends on the form of the disease and on the presence or absence of complications. Physicians now take a much more hopeful view of the trouble than they did and, provided that no complication such as phthisis, obstruction, or perforation arises, the outlook in the young is not now considered nearly as bad as it was formerly.

**TREATMENT.**—This is partly medical and partly surgical ; in the early stage the treatment lies with the physician.

**Medical.**—The patient should be placed under the best hygienic conditions ; tuberculin injections (see Vol. I. p. 522) should have a trial. When there is intestinal ulceration, the diet must consist entirely of fluids which should be selected for their nutritive value, such as milk and raw meat juice. The bowels should be regulated ; if ascites is present, diuretics will be called for. Cod-liver oil may be given either by the mouth or by the rectum, and arsenic is of use. Intestinal anti-septics, such as creosote, salol or guaiacol may also be employed. Dr. Burney Yeo speaks highly of abdominal inunction with iodoform ointment and the internal administration of iodoform in the form of one-grain pills three times a day. When pain is very marked, the local application of belladonna to the abdomen or a subcutaneous injection of morphine may be desirable. Open-air treatment, with complete rest in bed in the first instance at any rate, should be carried out.

**Surgical.**—Until comparatively recently surgical interference was not thought of unless some complication occurred, and this, to some extent, is the case even now. It has been found however, in a number of cases in which the abdomen has been opened for other reasons, that tuberculous peritonitis has been present, but that nevertheless the condition has rapidly improved after the operation, although nothing was done beyond opening the abdomen ; this has occurred so frequently that, of late years, simple laparotomy has become the chief surgical measure for cases which do not yield to medical treatment.



with various antiseptics such as carbolic acid or sublimate lotions, or was flushed with salt solution and carefully dried with sponges. These methods seem unnecessary, as equally good results are obtained after simple laparotomy. When adhesions are present, great care is necessary in opening the abdomen to avoid injury to the intestine and, if the adhesions are firm and numerous, it is better to close the wound rather than force a way in among the intestinal coils; the bowel is usually fragile, and any attempt to separate adherent coils may result in laceration of the intestine at the time or may so injure its wall as to lead to the formation of a faecal fistula subsequently. When pus is found, it should be washed out by salt solution, and some iodoform and glycerine emulsion should be introduced into the abscess cavity before it is closed.

Various important points have to be considered in connection with the operation, the first of which is the question of drainage when fluid is present. There seems to be no advantage in this when the fluid is serous; indeed, it may lead to a tuberculous sinus. When pus is present, provided it is not foul or apparently infected, it is best to treat it like a chronic abscess elsewhere, washing out the cavity and leaving in a little iodoform and glycerine (see Vol. I. p. 234); if, however, the pus is infected with pyogenic organisms, drainage must be provided.

Another important question is whether the primary focus should be searched for, and removed. Much will depend on the condition of the patient and the extent of the disease in the peritoneum. Theoretically, of course, the primary focus should be removed, and practically it has been found that the best results have followed this practice in suitable cases, seen early. On the other hand, the disease is very extensive in the majority of cases to which the surgeon is called and the question becomes much more complex. As a result of what has been done in this way, we would formulate the following opinion: When the tuberculous disease is strictly localised to the neighbourhood of the primary focus—*e.g.* when only a few coils of small intestine are affected in the neighbourhood of an intestinal ulcer; when the disease is confined to the cæcum and the neighbouring parts of the ileum as is not infrequently the case; when the appendix is the primary seat of the disease; or when there is only a commencing eruption of tubercles about the Fallopian tubes without any extensive matting of the intestine, the primary focus should be removed, provided the patient's strength is good, even though it involves resection of the small intestine or of the cæcum, or removal of the appendix or of the Fallopian tubes, and the results obtained are certainly better than those of simple laparotomy. On the other hand, in the more advanced cases, adhesions are present and it is excessively difficult, in the first place, to find the primary focus and, in the second, to remove it when found. Here also the patient is generally run down and cannot stand a prolonged operation; moreover, the tuberculous intestines are so fragile that they tear readily and a faecal



lasted for some time or (in the case of intestinal tuberculosis), the gut has become narrowed and symptoms of obstruction are present ; as a matter of fact, there were symptoms of commencing stricture before operation in Mr. Mayo Robson's cases. It does not seem probable that there is much of a future for short-circuit operations in intestinal tuberculosis apart from obstruction. The extent of the mischief is variable and a large portion of the alimentary canal might have to be shut out and, further, the operation will not give complete rest to the intestine unless there is marked obstruction, as a large portion of the contents will still pass through the ulcerated bowel.

**Treatment of a faecal fistula.**—Here operation is practically hopeless. Suppuration followed by faecal fistula occurs especially in the very bad caseating forms in which the intestine is not in a fit condition for repair ; generally also the patient is in a very low state of health and the chances are probably equally good if he is left alone. Quite a considerable number of these fistulae close if the condition of the patient improves.

### CHRONIC NON-TUBERCULOUS PERITONITIS.

A sub-acute non-suppurative peritonitis may occur as the result of *rupture of an hydatid cyst* into the peritoneal cavity. This is often followed by symptoms of acute poisoning, probably from some toxic substance in the fluid effused, and this may be dangerous to the patient if the fluid is not evacuated ; a certain amount of peritonitis is also set up, which may lead to the formation of adhesions. In these cases the sooner the peritoneum is opened, the cyst removed or drained, and the abdomen washed out with saline solution, the better.

*Rupture of an ovarian cyst* may lead to an attack of peritonitis which tends to fix the cyst. This is more marked if the cyst is a proliferating one, in which case villous growths quickly form over the peritoneum. In these cases the abdomen should be opened as soon as possible after the rupture, the cyst removed, and the effused fluid washed out.

A generalised chronic peritonitis also accompanies *peritoneal cancer*, which usually follows extension of a growth through the peritoneal coat of the bowel or some other viscus ; it may arise, however, without any primary focus outside. Ascites rapidly develops, but there is no marked tendency to the formation of adhesions. For these cases nothing can be done except to perform paracentesis if the abdomen becomes so much distended with fluid as to affect the action of the heart or lungs.

*Localised chronic peritonitis* also occurs over ulcers and inflammations of the stomach, intestines, and other viscera, leading to the exudation of lymph and the formation of *adhesions*. We have already referred to the gravity of these adhesions in certain cases, and have pointed out that they may compress the organs over which they have formed, e.g. the



## ASCITES DUE TO CIRRHOSIS OF THE LIVER.

Although not necessarily a disease of the peritoneum, this seems to be the most convenient place to refer to the modern treatment of ascites when it occurs as the result of obstruction of the circulation, usually from cirrhosis of the liver. In the cases of ascites due to other causes, paracentesis still remains the only surgical measure.

**TREATMENT.**—The treatment of this form of ascites may be either palliative or radical. In the former case the fluid is removed by tapping, the operation being repeated whenever the re-accumulation of fluid renders this desirable; in the latter an attempt is made to establish a collateral circulation or to drain the fluid into the lymphatic vessels outside the abdomen.

*Paracentesis abdominis*, or tapping the abdomen, is best done with the patient in the semi-recumbent position, so that he can be laid flat at once if he becomes faint. The spot selected for puncture is generally the middle line about two inches below the umbilicus, but in any case the puncture must be made into an area from which the bowel—as ascertained by percussion—is absent. The bladder should be emptied before the operation. The skin is purified in the ordinary manner and a broad bandage is arranged around the abdomen, which can be tightened as the fluid escapes. A nick is made through the skin with a scalpel, and a trocar and canula of appropriate length thrust rapidly through the abdominal wall. When the trocar is withdrawn, a long piece of sterilised india-rubber tubing is connected with the canula and the fluid is conducted into a suitable receptacle. Care must be taken to ensure asepsis throughout. A local anæsthetic may be employed if desired, but this is rarely necessary. The fluid should be allowed to escape very gradually; an hour may be necessary, otherwise faintness is apt to occur.

Some surgeons prefer *Southey's tubes*, and proceed in the following manner: The canula, guard, and tubing are all fitted together and the tubing is drawn sideways across the end of the canula, so as to form a diaphragm through which the trocar is thrust. The trocar and canula are then thrust into the peritoneal cavity and the trocar is withdrawn leaving the tube in position; the small hole made by the trocar in the tubing either falls together or is closed by pushing the tube a little farther on to the canula. As the flow lessens, the sides of the abdomen may be compressed either by the patient himself or by the broad bandage passed round the body. When the flow ceases, the tubing is disconnected, the finger is applied over the orifice of the canula and the instrument withdrawn. The opening is closed by a small pad of cyanide gauze fastened in place with collodion, and a firm binder is applied for a few days.

*Radical treatment.*—Only a limited number of cases are suitable for radical treatment. Cases of severe alcoholic cirrhosis in which the





after about ten days is replaced by a small rubber tube which is shortened daily and ultimately removed altogether. It happens in some cases that symptoms of depression occur, which have been attributed to the introduction into the systemic circulation of blood, which has not passed through the liver ; these symptoms are best treated by brisk purgation.

*Abdominal lymphangioplasty.*—The abdomen is opened below the umbilicus, and a series of silk threads are darned in and out through the parietal peritoneum over the iliac fossæ, the loops which project into the abdominal cavity being left fairly long. The threads are then carried underneath the outer part of Poupart's ligament and distributed in the subcutaneous tissue of the upper part of the thigh and buttock.

Another method consists in attempting to establish drainage through the femoral canal. The saphenous opening is exposed as for the radical cure of a femoral hernia and the canal dilated. The peritoneum is then sought for, and brought down and sutured to the edge of the opening beneath Poupart's ligament, or a hollow glass button is inserted in the ring. The wound is then sewn up and the ascitic fluid escapes into the cellular tissue in Scarpa's triangle and is absorbed by the lymphatic vessels.



the contents only are returned into the abdomen, leaving the sac lying in the canal.

The coverings of the sac consist of the structures superficial to the aperture through which the hernia passes, and are fully described in anatomical text-books. In practice it is often difficult or impossible to distinguish the various coverings, especially in old-standing herniæ which have become strangulated. The sac is recognised, after all the superficial structures have been peeled off, by its thin transparent appearance ; it possesses no large vessels, and if these are present after the sac has presumably been cleared it is certain that all the coverings have not been removed.

Most of the abdominal viscera have been found in hernial sacs ; the most common are portions of the omentum or the small intestine, or both together. The large intestine is not uncommonly present—especially in herniæ on the left side—and the cæcum, with or without a sac, the appendix, or the ovary may also be met with. Various important changes take place in the contents, which will be considered in connection with irreducible hernia.

The *causation* of hernia is a much debated subject. According to Hamilton Russell practically all herniæ are congenital in the sense that the sac is present at birth ; but a variety of predisposing causes may be mentioned, of which the chief are heredity, occupations entailing constant exertion in positions that leave the weaker portions of the abdomen unprotected, feeble abdominal muscles from faulty nutrition or debilitating illnesses, imperfect development of the abdominal wall, the distension of pregnancy, constant cough, marked straining—as in stricture of the bowel or urethra, phimosis, or enlarged prostate—various inflammatory affections of or operations upon the abdominal wall, and abnormal length of the mesentery.

The chief exciting causes are sudden strains while the body is in a position in which the abdominal orifices are not protected ; hence hernia is more frequent in men than in women.

The *symptoms* of hernia are too well known to need description.

Hernia may be *classified* in various ways. The cases may be divided into two great groups according as they form in connection with parts in which there is naturally a weakness of the abdominal wall—*e.g.* inguinal, femoral, or obturator hernia—or according as they protrude at parts where the walls have been weakened as the result of injury or disease. Again, they may be classed as *complete* or *incomplete* hernia ; a complete hernia is one which has passed through all the muscular coats of the abdomen, and an incomplete one is one still covered by one or more of the muscles, the typical examples being complete inguinal hernia, which has come out through the external abdominal ring, and incomplete inguinal hernia or bubonocoele, in which the hernia is still in the inguinal canal. A third division is into *reducible* and *irreducible* hernia, according as the contents



Another name sometimes given to these herniæ is *incarcerated hernia* ; the term is a bad one and there is no practical advantage in its use.

(d) **Strangulated hernia.**—Here not only is the passage of the contents of the bowel interfered with, but the circulation of the blood in the mesentery and bowel is also affected, and the condition becomes very grave. The mechanism is practically identical with that of acute intestinal obstruction from internal strangulation (see p. 332). The constriction is usually at the neck of the sac, and is often caused by that structure itself if it has become thickened—*e.g.* after the prolonged use of a truss ; in that case it forms an unyielding ring which prevents the return of the bowel and impedes the circulation of the blood. In other cases the constriction may occur at the opening in the abdominal wall through which the hernia passes—*e.g.* in femoral hernia, where Gimbernat's ligament plays an important part. More rarely still, the constriction is within the sac itself : for example, the bowel becomes strangulated either through a hole in the omentum or under adhesions between the latter and the sac wall ; this is not uncommon in umbilical hernia, and it is most important to bear it in mind in those cases. In operating on large strangulated omental herniæ the contents of the sac must not be put back *en masse*, but the omentum should be opened out first so as to make sure that no knuckle of bowel is caught in it.

*The changes in the bowel in strangulation.*—Congestion rapidly occurs in the strangulated loop and it soon becomes purple in colour or even black ; the lumen is distended and the walls become swollen and less supple. The peritoneal coat, which at first retains its polish, loses it, later on sub-serous hæmorrhages occur, and in the later stages it becomes grey and gangrenous—at first in spots and finally all over. All strangulated herniæ after a time become gangrenous, and it is most important to recognise impending gangrene. A mere dark colour does not imply gangrene so long as the bowel is firm and elastic and the peritoneal coat is glistening ; but directly the latter loses its polish and the bowel becomes soft, the condition is very grave. When gangrene is present, the gut becomes greyish, flabby, and collapsed and there are often soft greyish spots on the convexity of the loop where the peritoneum has lost its lustre. There is a definite sulcus at the seat of constriction and here the lesions are most profound, and gangrene usually occurs first. This part must therefore always be examined before the intestine is returned into the abdomen.

The changes are most marked in the proximal portion of the constricted loop, and are generally more intense along the convex than along the mesenteric border. In the former situation the bowel wall is thinned instead of being thickened, as is the rest of the loop, and it may be gangrenous. The mucous membrane is generally affected first, and most severely. Stricture of the bowel occasionally follows after an operation for strangulated hernia in which doubtful bowel has been



easy to diagnose as there may be no tumour present, unless there is also omentum in the sac. There may be no constipation because the lumen of the bowel is not actually interfered with ; vomiting may not be present, and flatus often passes freely. The constitutional symptoms, however, are often well marked ; the pulse is small and rapid, the breathing is hurried, and there is the same anxious aspect as in complete strangulation. The portion of intestine nipped is usually badly damaged, and gangrene often occurs quite early. In the condition known as *Littré's hernia*, Meckel's diverticulum becomes strangulated and the lumen of the bowel is not absolutely occluded.

**TREATMENT.**—The treatment of hernia depends on a number of varying conditions—such as the age of the patient, the situation of the hernia, its reducibility or irreducibility, the presence or absence of strangulation, and the general fitness of the patient for operative interference ; these points are dealt with in connection with the individual forms of hernia (see Chap. XXX.). We shall here only indicate the general principles of treatment.

As the most important questions with regard to the treatment of a hernia depend on its reducibility or irreducibility, we shall consider the treatment suitable for reducible and irreducible hernia respectively.

### TREATMENT OF REDUCIBLE HERNIA.

The treatment of this form of hernia consists either in reduction of the hernia by manipulation, and its retention by a suitable truss, or in the so-called 'radical cure,' in which the contents of the sac are reduced, the latter obliterated, and the opening in the wall of the abdomen diminished or completely closed.

The question of operative *versus* non-operative methods is influenced by many considerations—*e.g.* by the nature and situation of the hernia, the probability of permanent cure by operation, the age and occupation of the patient, whether he is able to obtain medical assistance should strangulation occur, his health, and the size of the hernia. Further, no one suffering from a hernia is admitted to the public services—*e.g.* army, navy, police, and others—and operation may be desirable to enable them to do so.

**Treatment in infants.**—Hernia in infancy is usually umbilical or inguinal, and there is still a diversity of opinion upon the question of operation. Some surgeons delay the operation until the child is three or four years old, partly on the ground that the prolonged use of a truss may cure the hernia, partly because of the small size of the parts to be operated upon and the difficulty of keeping the wound clean, and partly because of the natural reluctance to operate on an infant unless it is absolutely necessary. Experience shows, however, that complete obliteration of the sac is not effected by a truss nearly so often as has been





and is liable to frequent trouble with his truss which incapacitates him in many ways. He is often exposed to violent strains which cause the hernia to slip down behind the truss, he nearly always wishes to pursue occupations or amusements demanding full vigour, and he may be out of reach of medical aid for considerable periods.

We therefore strongly advise that, unless there be some definite contra-indication, a hernia in a young adult should be operated on by one of the methods described in Chap. XXX. The principal contra-indication is some illness which makes the patient an invalid or absolutely forbids operation.

On the other hand, however, feeble, old people with flabby abdominal walls, who are accustomed to wear a truss and do not object to do so, in whom the truss keeps up the hernia satisfactorily and whose occupation

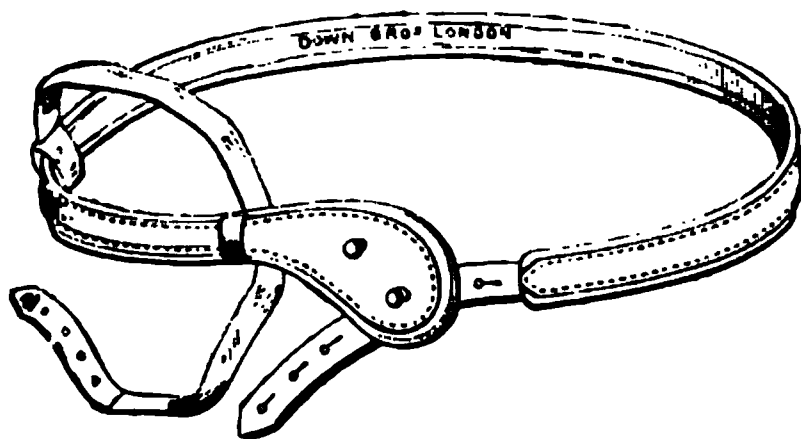


FIG. 151.—SINGLE TRUSS FOR INGUINAL HERNIA.

is sedentary, need not be urged to undergo the operation. In alcoholic and bronchitic subjects, operation is inadvisable.

The question is often raised as to whether the hernia is really cured by operation or not. In practice, it is found that the vast majority of operations done in childhood and youth are completely successful if done on proper lines (see Chap. XXX.), and even in elderly subjects the success is much greater than might be expected.

The least satisfactory cases are those in which a strangulated hernia is operated upon without any attempt being made to perform a radical cure. Here the abdominal opening and the neck of the sac have been enlarged at the operation, and when the patient begins to get about there is frequently a larger hernia than before, and this comes through a canal which is now cicatricial instead of muscular, so that there may be great difficulty in getting a truss to keep it up. Operations upon cases in which there is much cicatricial tissue seldom bring about a radical cure; nevertheless it is often necessary to perform an operation on the lines of the ordinary radical cure in these cases, the object being rather to enable the patient to wear a truss than to dispense with one altogether.

*Palliative treatment.*—This consists essentially in the employment of *trusses*; particulars of these are given in connection with the individual herniæ (see Chap. XXX.), but we may here indicate the general principles



shape of the pad should be specified when ordering, together with some idea of the amount of force required to keep the hernia in position. The latter point is ascertained by reducing the hernia, keeping the thumb or forefinger over the orifice, and making the patient cough or strain. The size of the ring is also an important point and should always accompany the instructions to the instrument-maker. The surgeon should never leave the choice of the kind of truss to the instrument-maker.

*In applying the truss* the patient should lie down and reduce the hernia, which he usually does readily after a little practice. While he is in the horizontal position he should pass the spring of the truss around the body, the pad lying well above the hernial aperture. He now makes sure that the hernia is entirely reduced and then slips the pad into position; the truss is then fastened and the perineal band applied. In order to test the efficiency of the truss the patient should be examined sitting and walking, and should be made to cough and to lift weights; under all conditions a suitable truss should keep back the hernia.

The truss should be worn continuously night and day. Many authors hold that, unless there be some distinct reason—such as chronic bronchitis—it is needless to wear the truss at night, but there is no doubt that sudden movements in bed or during sleep, or a fit of sneezing or coughing may force down the hernia and lead to serious consequences; quite a number of herniæ become strangulated during the night. As however the strain on the truss is only slight during the night, a much lighter spring may be used. An india-rubber-covered truss is required for use in the bath.

The skin beneath the pad is apt to become excoriated from friction and the accumulation of moisture; the sweat decomposes and soaks into the pad which becomes hard and foul and is a further source of irritation. The parts should therefore be cleansed night and morning and dusted with equal parts of boric acid, oxide of zinc, and starch or powdered talc, while boric lint should be inserted between the truss and the skin to absorb the moisture; it is also well to use linen covers over the pad, and these should be changed frequently.

If the truss causes pain it may be that it fits badly—in which case an alteration in the spring or a readjustment of the pad will remedy the discomfort—or that there is adherent omentum in the sac which becomes pressed on and gives rise to pain.

Careless patients may adjust the truss before the hernia is quite reduced and there is then pain and inflammation, and a previously reducible hernia may be transformed into an inflamed and irreducible one. A similar condition occurs when the truss does not keep up the hernia completely; one of the commonest causes of irreducibility is imperfect truss support.

Much rarer complications caused by wearing a truss are adenitis and the occurrence of varicocele. These are generally due to too powerful a spring and are remedied by altering it or the shape of the pad. In



hernia, and too much weight must not be laid on the patient's age. The size of the hernia must influence the question to some extent, and it may be safer for a very old subject, with a very large scrotal or umbilical hernia, or with grave constitutional disease, to wear a suitable bag truss than to undergo an operation for radical cure; in the great majority of cases, however, operation is the proper treatment.

**Obstructed and inflamed herniæ** are very important, because, if the condition persists, it is very apt to end in strangulation.

*Operative treatment.*—Unless there is a definite reason to the contrary, these conditions should be regarded as necessitating an immediate radical cure. The obstruction or inflammation may subside under treatment (*vide infra*), but these herniæ are usually irreducible, and a truss is therefore inefficient; moreover, the attack of inflammation is likely to give rise to increased adhesions in the sac, while it is impossible to be sure that strangulation may not supervene under unfavourable circumstances. There is no objection to operating on an obstructed or even an inflamed hernia, and the patient will probably submit at once if the state of matters is explained to him.

*Palliative treatment.*—Should the patient refuse operation or should it be considered inadvisable, he must be kept in bed on his back with the knees flexed over a pillow so as to relax the abdominal muscles as much as possible. Cold should be applied to the hernia, whether it be inflamed or simply obstructed, by means of Leiter's tubes or an ice bag. The diet should be fluid. Repeated enemata, which may contain from one to four drams of turpentine, should be given. Aperients should be avoided, but belladonna and strychnine may be given by the mouth so as to increase peristalsis. When there is no marked inflammation, very gentle and careful taxis may be applied from time to time, and in the intervals the hernia should be supported and compressed by a suitable elastic lace-up truss. The return of the hernia may be expedited by raising the foot of the bed on blocks. Opium should be avoided. Should signs of strangulation appear, immediate operation must be undertaken.

After the condition of obstruction or inflammation has passed off, the patient should again be urged to submit to a radical cure unless some serious contra-indication is present.

#### TREATMENT OF STRANGULATED HERNIA.

It is absolutely essential that the strangulation should be relieved and the bowel returned into the abdominal cavity with the least possible delay quite irrespective of the age or constitutional condition of the patient; there are only two methods of doing this—namely, by taxis or by operation. Unless the strangulation is relieved, the patient will almost certainly die; the number of cases which recover after the spontaneous



and should if possible be attempted on a table and not on the bed. The pelvis should be raised, full relaxation should be secured by suitable position of the limbs, and the hernial orifice should be made the highest point of the abdomen. The surgeon grasps the neck of the sac with the left thumb and forefinger and pulls it down in the direction of the canal, and thus prevents the hernia, when pressed up by the other hand, from overlapping the edge of the orifice, and so guides it in its proper course. The entire hernia is grasped with the right hand, and gentle and equable pressure is exerted on it ; the tips of the fingers should not be pushed into the sac. The object is to squeeze out the contents of the incarcerated loop gradually, so that the emptied bowel may pass back through the ring. The experienced surgeon will soon be able to tell whether or not the taxis is likely to succeed. The chief indication of success is the gradual diminution in the size of the tumour. As the reduction goes on, the bubbling of gas is often felt ; when this happens, and not before, the compression of the sac is changed to a steady upward pressure so as to push the remaining loop through the hernial orifice.

Strangulated hernia in infants is a rare condition, probably owing to the fact that there is no definite fibrous ring developed in the neck of the sac. In these cases, therefore, inversion may be tried for five or six hours, when the hernia cannot be reduced by gentle taxis. The child is laid on his back on the seat of an arm-chair with his head towards the edge, and the buttocks are raised on a firm pillow and the legs tied with a scarf or bandage over the back of the chair so that the hernia is at the highest point of the abdomen. Gravity will generally serve to reduce the hernia.

**Operation.**—The steps of the various operations are described in connection with each particular form of hernia. In the first place the hernial sac and its coverings are exposed. The coverings are then divided, separated from the sac, and slit up until the neck of the sac is exposed. The sac is now gently pulled down so as to ascertain whether the constriction is in the neck itself, or is due to the rigid abdominal ring. In the former case, it is often possible to relieve the constriction by nicking the thickened neck ; in the latter, the ring should be enlarged in certain definite directions, either upon the finger-nail or upon a director insinuated between the neck of the sac and the abdominal parietes. If it be necessary to enlarge the opening in the abdominal parietes—*i.e.* to incise the ring—this is best done before the sac is opened, as there is then less risk of injuring the bowel.

The next step is to open the sac below the neck, taking care, however, to ascertain first that the bowel is not adherent to its wall. As a rule the sac of a strangulated hernia contains fluid which (except in old irreducible cases) distends it and removes its wall from the intestine. A small portion of the sac is pinched up and nicked, a director is introduced, and the sac laid freely open. The opening in the sac is then





near the neck of the sac as possible—and usually if the whole sac is exposed before an attempt is made to open it some point can be made out where fluid is present and where therefore it will be safe to incise ; the rest of the sac may then be freed before any attempt is made to reduce the hernia.

The intestine is only adherent to the sac when there have been recurrent attacks of inflammation, or when the large intestine is present—*e.g.* a cæcum without a proper meso-cæcum. The connection between the bowel and the sac wall may be so intimate that it is impossible to free them, and it may be necessary to return the bowel into the abdomen with a portion of the sac wall attached to it.

**Unusual contents of the sac.**—The *bladder* is not uncommonly found in connection with the sac in both inguinal and femoral herniæ, and may either bulge into it and form part of its contents or, more commonly, may be applied to the inner side of its neck, being pulled down along with the peritoneum ; it has happened that the fleshy mass in this situation has not been recognised as the bladder, and has been torn when separating the neck of the sac ; or, what is apparently still more common, a portion has been included in the ligature applied to the neck of the sac. Should the bladder be injured, the muscular coat should be stitched up and a tube left in the wound. If the bladder has been included in the ligature, there will be hæmaturia, pain on micturition, and irritability of the bladder, and should these symptoms arise, it would be wise to open up the wound, remove the gangrenous portion of the bladder and stitch up the opening.

Among other unusual structures found in a hernial sac are the *ovary* and *Fallopian tube* or the *appendix*. An appendix in a hernial sac, whether strangulated or not, is usually elongated and thickened, and may become the seat of acute appendicitis. Hence, it is always well to remove the process during the operation (see p. 417), unless the patient is so feeble that he cannot stand any prolongation of the operation. The ovary or Fallopian tubes should be returned unless they are considerably damaged, in which case the comfort of the patient will be best secured by removing the affected parts.

**Treatment when the vitality of the contents is defective.**—If the surgeon finds that the sac contains blood-stained fluid, that the bowel is of a deep purplish brown colour, and that the peritoneal coat has lost its shining appearance in places and shows greyish or greenish-brown patches, the condition is one of commencing gangrene of the intestine. Even when the strangulated loop is still alive, gangrene may be occurring at the seat of constriction, or the vessels in its mesentery may be thrombosed, and gangrene must therefore result. The prognosis in these cases is extremely grave.

Intermediate between the cases in which the loop is evidently sound and those in which it is obviously gangrenous are quite a number in



fix it in the wound either with strips of gauze or by stitches. The wound should be left open and covered with Lister's protective or thin sheet rubber until it is seen what is going to happen. If gangrene and perforation occur, a moist boric dressing should be applied until the sloughs have separated; if the bowel recovers, the patient should be put under an anæsthetic, the newly formed adhesions gently separated

FIG. 157.—INTESTINAL ANASTOMOSIS FORCEPS FOR GANGRENOUS BOWEL. The object of this instrument (which was introduced by Mr. Edmunds) is to provide a lateral anastomosis at some distance from the opening of the bowel, and at the same time to drain off its infective contents (see *Practitioner*, March, 1908).

The two ends of the bowel are arranged so that their lateral or antimesenteric borders are in apposition. One blade of the clamp is slipped down inside each piece of gut and the instrument closed. The bowel between the blades of the forceps sloughs away, leaving an opening, the edges of which are united by plastic peritonitis. The mechanism is exactly that of the Murphy's button. As soon as the forceps are in position, the modified Paul's tube is slipped into the upper end of the bowel in such a way that the shank of the forceps occupies the groove in the side of the tube; the forceps, the tube, and the bowel are fastened together with a stout silk ligature (C). This process is now repeated with the lower end of the bowel. In order to prevent displacement of the bowel one or two sutures may be inserted between its muscular coats and the skin. The forceps are to be left in position for a week and then withdrawn, leaving the patient with a small intestine fistula and a lateral anastomosis.

with the finger, the bowel returned into the abdomen, and the wound closed.

When there are only one or two suspicious spots on the bowel and it is decided to return the latter, it is well to invert the suspicious areas by Lembert's sutures so that perforation will not take place into the abdominal cavity should they become gangrenous.

When there is actual gangrene of the bowel the case may be seen before or after perforation has occurred. In the former event the surgeon has the choice of two procedures—namely: (1) excision of the affected loop followed by immediate anastomosis and return of the bowel into the



## CHAPTER XXX.

### HERNIA : THE TREATMENT OF THE INDIVIDUAL FORMS.

#### INGUINAL HERNIA.

THERE are two forms of inguinal hernia which must be considered separately—namely, the *congenital form* in which the sac has existed, from birth, and the *acquired form* in which the sac is probably newly formed.

In congenital hernia—of which there are several varieties—the sac is the unobliterated portion of the funicular process of the peritoneum, and various conditions may be present (see Fig. 158). The process may be patent from end to end—the cavity of the peritoneum above being continuous with that of the tunica vaginalis below ; it may be obliterated with the exception of a small funnel-shaped portion at the upper part ; or the upper part alone may be obliterated, so that a hernia, pushing a fresh sac before it, invaginates the unobliterated portion of the funicular process below—the so-called ‘ infantile hernia.’

Inguinal hernia may also be divided into the *oblique* and the *direct* forms. The ordinary oblique inguinal hernia descends along the cord from the internal abdominal ring, and may be congenital or acquired ; the direct form passes out on the inner side of the deep epigastric artery, either stretching or perforating the conjoined tendon, and is always acquired.

#### REDUCIBLE OBLIQUE INGUINAL HERNIA.

Cure may occasionally, but rarely, follow the continued application of an efficient truss in the congenital herniæ of infancy and early childhood ; if the hernia is kept reduced from the first, the funicular process may become obliterated, partly in the course of the natural development



—although an effort should always be made to keep it from descending during the changing of the bandage—and, the bandage is drawn tight with the point at which the ends pass through the loop exactly over the internal ring. The free ends are carried round the fold of the perineum, brought up behind the buttock on the affected side, and fastened to the horizontal limb of the bandage; while this is being done pressure is made to keep up the hernia.

The loop is stitched at the point where the ends of the bandage pass through it, in order to prevent it from slipping. Unless the hernia is large this arrangement will generally keep it up; should the hernia descend behind the bandage it usually means either that the pressure is not applied at the proper spot or that the band has not been drawn tight

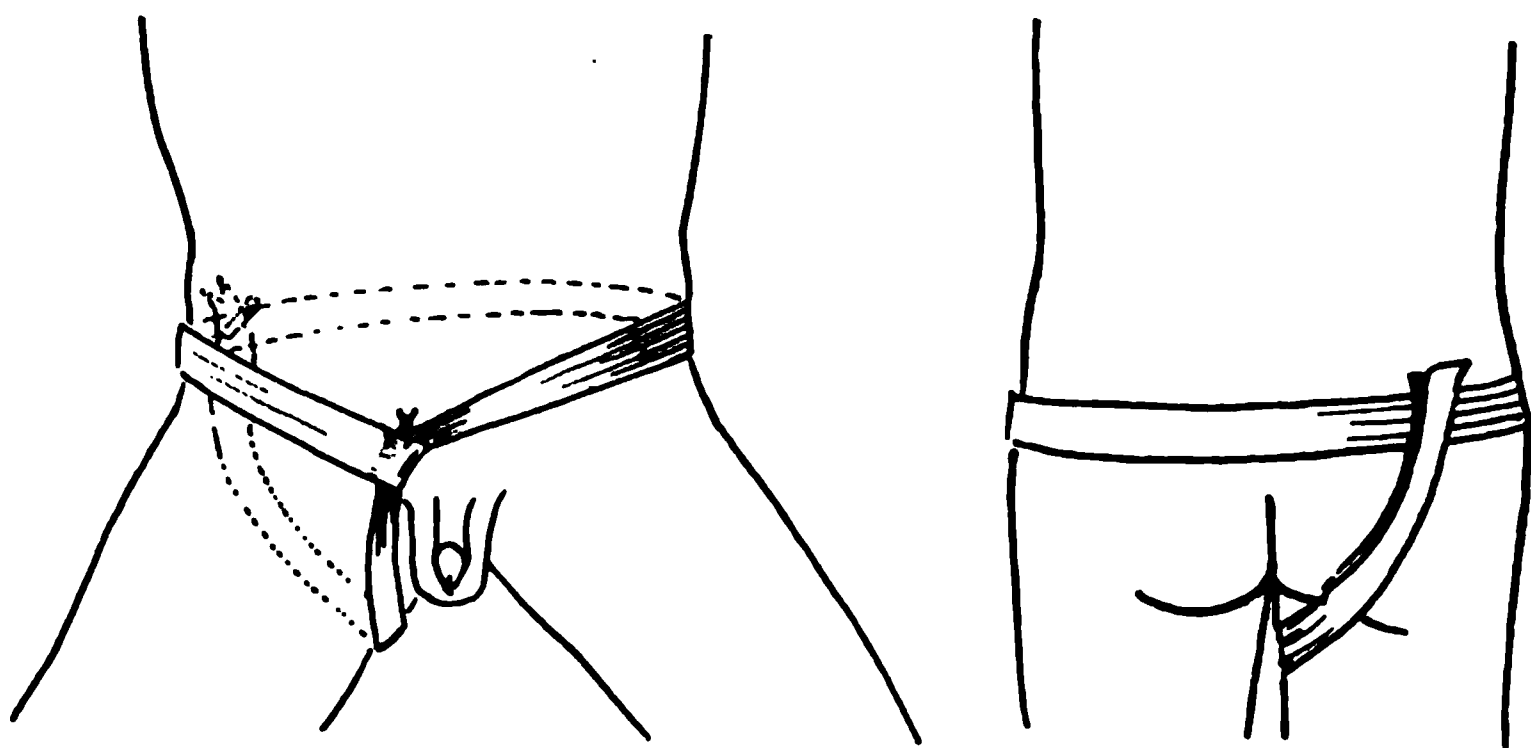


FIG. 159.—THE FLANNEL BANDAGE FOR INGUINAL HERNIA IN INFANTS. The sketches show how the bandage is looped so as to exert pressure over the inguinal canal.

enough. In a bilateral hernia a similar bandage may be used for the opposite side. The child should be bathed before the bandage is removed, and then it should be taken off and a fresh one applied; the old one can be washed and used again when dry.

A skein of worsted is often used instead of the flannel; one loop is brought over the seat of the hernia and the other end of the skein is passed round the pelvis as before, brought through this loop, and the whole is tightened up until the point of junction is over the internal ring, when the free end of the skein is carried down between the legs and fastened to the horizontal limb as described above. The objection to the worsted is the expense, because this sort of truss in an infant must be changed several times a day, and the worsted soon shrinks and becomes hard, while the individual threads mark the skin and cause discomfort; on the whole the flannel is preferable. The difficulty with these bandages is that the mother or nurse often fixes them wrongly. It is not sufficient to explain





**In adults.**—The remarks already made upon the question of a radical cure *versus* a truss (see p. 465) apply in their entirety to inguinal hernia.

**Trusses.**—Should it be decided that the patient is to wear a truss—and even if operation is decided on, a truss should be worn until it is performed—the following points must be attended to in ordering the truss. The circumference of the pelvis is measured from the centre of the external ring to a point midway between the top of the great trochanter and the crest of the ilium, and then horizontally around the pelvis on this level back to the centre of the ring. The sex, occupation, and social habits of the patient should be notified, together with some idea of the size of the ring and the amount of pressure required to keep up the hernia. It is also well to state whether the patient is stout or not, and whether a perineal band will be required; this, as a rule, is only essential when the abdomen is very flat, as in the opposite condition there is no great tendency for the truss to slip up. The pad should be as flat as possible, and just large enough to overlap the ring in all directions and to press on the lower end of the inguinal canal. It must be so arranged that the vas deferens is not pressed upon, and if the ring is large and considerable pressure is required, it is well to employ the horseshoe pad designed by the late Professor Wood, which avoids pressure on the cord (see Fig. 154). Wood's horseshoe truss is also useful in direct herniæ, because in these cases the ordinary truss is apt to press upon the cord; it is also suitable for those who are very susceptible to pressure and who rapidly develop varicosity of the veins of the cord as a result. The ordinary spring truss takes its purchase behind over the sacrum, and should pass round the body midway between the iliac crest and the top of the great trochanter. It should lie flat against the skin everywhere, except near the junction of the spring with the pad.

Special trusses are used for cases of retained testicle complicating a hernia, for scrotal hernia (see Fig. 161), and for irreducible hernia (see Fig. 155); but in our opinion these are very rarely called for. In all these cases a radical cure should be performed, unless there is some very serious contra-indication. When the muscles are very lax, the subjects very fat, and the herniæ very large, the radical cure may not be permanent; but even then it is of great value, as it allows the patient to wear an ordinary truss.

When a radical cure is not performed for a reducible scrotal hernia, a form of truss is often used which has a strong spring and a triangular-shaped pad—the so-called 'rat-tailed truss' (see Fig. 161). A strap passes from the lower angle of the pad, under the perineum, and is fastened to the spring on the same side of the body as the hernia. The perineal band in this truss is meant to exert direct pressure upon the canal, while that in the ordinary form merely prevents the pad from slipping up. This truss must never be used unless the hernia is completely reducible.



*An essential part of any operation is the complete obliteration of this structure, for, if it be left patent, the hernia will come down into it again however the canal may have been dealt with. It is most important not only that the sac should be removed, but that not even a dimple should be left at its neck.*

Obliteration of the sac may be effected in several ways. The one most often employed is *ligature and removal of the whole sac and displacement of the stump*. A needle carrying a double thread is passed through the peritoneum just above the neck of the sac, after it has been cleared both of its contents and its coverings, and these threads are tied on each side and the sac cut away. One end of each thread is left long, the

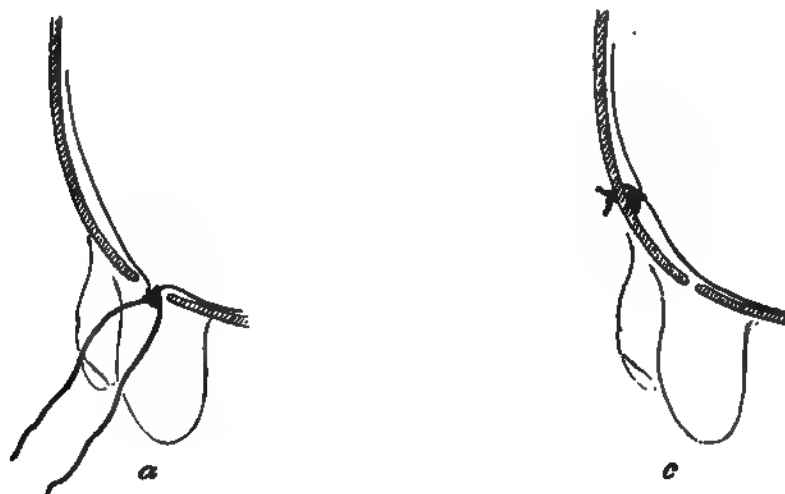


FIG. 162.—METHOD OF TREATING THE NECK OF THE SAC BY LIGATURE IN THE RADICAL CURE OF HERNIA. In *a* the neck of the sac has been ligatured and the sac itself cut away, *b* and *c* show how the ends of the ligature around the neck of the sac are passed through the abdominal walls, so that when they are tied the peritoneum is drawn flush over the ring and all trace of a hernial dimple is obliterated.

peritoneum is separated from the muscles by the finger, and the ends of the ligatures are then carried through the abdominal muscles from behind forwards at a point well above the ring, so as to drag the stump well away from the hernial orifice (see Fig. 162).

This is a very efficient method, but it must be done thoroughly. If the sac is ligatured a little below the neck, a funnel-shaped projection is left into which a hernia may again find its way. It is, therefore, essential to remove the neck as well as the body of the sac, and in order to do this satisfactorily it is advisable to slit up the external oblique. The vas must be separated from the neck of the sac. It is also important to see that none of the contents are adherent to the neck of the sac or protrude through it, otherwise they may be injured. The neck of the sac itself must be carefully cleared; neglect of this precaution has led, for example,





















similar to that just described, but extra care must be taken not to injure the vas, which will be found on the outer wall of the sac ; it is very tortuous towards the lower end, and is very apt to be divided in cutting off the sac close to the testicle unless great care is taken to trace it to its origin.

#### DIRECT REDUCIBLE INGUINAL HERNIA.

The operation for radical cure is more difficult and the results less satisfactory in this form of hernia than in the oblique one. The sac comes down internal to the deep epigastric artery, either pushing the conjoined tendon before it or passing through an opening in it. These cases usually occur in oldish people, and the neck of the sac is so broad that it cannot be closed by twisting or ligature. It should be carefully cleared and inspected to see that it is not adherent to the bladder. The sac is then opened, its contents returned, the sac cut away, and the peritoneal cavity closed by a continuous catgut suture.

It is necessary to close the inguinal canal in these cases, and possibly this is best done by Halsted's method of bringing the cord direct through the abdominal wall ; this enables the posterior wall of the canal and the external oblique to be brought together over the whole region (see p. 487). In a good many cases the scar bulges subsequently and the patient may have to wear a truss, but this should not be commenced until bulging has actually taken place ; we have had a number of cases in which no truss has been necessary.

#### INTERSTITIAL HERNIA.

Here the sac passes upwards behind or between the abdominal muscles. In some cases the sac turns up at the internal ring, and lies entirely in the substance of or behind the abdominal wall ; in others it has two projections, one extending downwards along the canal and forming a bubonocoele, while the other runs up in front of the peritoneum as a diverticulum from the neck.

Radical cure is urgently called for in these cases, because the neck of the sac is bent and strangulation is very apt to occur. A truss is inadvisable because it is not easy to be sure that all the contents have been returned into the abdomen before it is applied.

The operation is practically identical with that described on p. 489. When there is no bulging in the inguinal canal the sac will be found projecting upwards behind the abdominal wall, and must be pulled down and treated in the usual manner (see p. 484). When part of the sac is in the inguinal canal, the operation is easier, because the diverticulum behind the muscles becomes exposed as the main sac is cleared.



when it is empty. After emerging from the saphenous opening the hernia, as it enlarges, travels upwards towards Poupart's ligament and outwards over the femoral vessels ; this is an important point to bear in mind in attempting reduction.

Femoral hernia generally occurs in adults, and is very rare before puberty. It is most common in women, and is indeed the commonest form of hernia in adult females. When it becomes strangulated, the constriction is usually in the neck of the sac ; but in a large and much distended hernia the neck is pressed firmly against the edge of Gimbernat's ligament, and mere division of the former will not always permit the reduction of the hernia. The pressure against the sharp edge of Gimbernat's ligament injures the neck of the hernia so severely that gangrene is more common and occurs earlier than in other forms of strangulated hernia.

#### REDUCIBLE AND SIMPLE IRREDUCIBLE FEMORAL HERNIA.

The hernia may be reducible or irreducible, and of the latter there are the various forms already spoken of on p. 461. The treatment of the reducible form is either by truss or by operation. In simple irreducible hernia a truss often causes so much pain that operative interference becomes imperative.

**Trusses.**—The truss employed in femoral hernia resembles that used for the inguinal variety, except that the pad is bent at a more acute angle to the spring and that there is no perineal band. The measurements which should be sent to the instrument-maker are the same as for inguinal hernia, except that the saphenous opening should form the starting-point and termination of the pelvic measurement, instead of the external abdominal ring. Nothing need be added to the remarks made on p. 482 concerning the management and application of the truss. In reducing the hernia the thigh should be flexed and strongly rotated inwards, the neck of the sac drawn directly downwards, and pressure exerted upon the hernia, at first downwards and inwards, and finally directly upwards.

**Radical cure.**—The radical cure of femoral hernia is not nearly so satisfactory as that of the inguinal form ; but at the same time in patients who lead an active life it is best to perform it, as they often suffer much pain from the truss, while the hernia is almost always irreducible and the radical cure will, at any rate, allow the truss to be applied without any pain or risk of injury to the sac or its contents.

Besides obliterating the neck of the sac, it is necessary to do something to reduce the size of the femoral canal, otherwise recurrence almost invariably takes place. Unlike the inguinal canal, the femoral is not bounded by active muscular fibres which close it every time the muscles contract, but is a rigid tube surrounded by fibrous tissue.





the femoral canal. It may be strengthened by a few silk stitches between Poupart's ligament and the periosteum.

#### STRANGULATED FEMORAL HERNIA.

The operation for strangulated femoral hernia is essentially the same as for the inguinal form (see p. 472); but here it is seldom possible to reduce the bowel without partially dividing Gimbernat's ligament, and this should be done in the inward and upward direction.

When the bowel is gangrenous and requires excision, this is better done from a fresh abdominal incision than from the wound in the thigh. It is very difficult to bring down enough of the gut through the crural canal to allow proper manipulations to be carried out. The original skin incision should be prolonged upwards, the rectus muscle pulled inwards, a vertical incision made behind it, and the intestine exposed as it enters the crural canal. The strangulated loop can then be drawn out of the abdomen through this opening, but care must be taken to cover the surface of the wound with gauze pads so as not to soil the wound in drawing the hernia out. It is usually easier to pull the hernia out from above than to push it back from below.

Femoral hernia rapidly becomes gangrenous when strangulated, and in some cases, when the patient is very ill and the gangrene complete, it may be best merely to open the bowel and form an artificial anus, which is closed afterwards (see p. 507); but if the patient's condition is good, an attempt should be made to restore the continuity of the intestine at once.

#### UMBILICAL HERNIA.

Umbilical hernia is a protrusion of some of the abdominal contents through the umbilicus or through an opening in its immediate vicinity. In infants the protrusion is directly through the umbilicus. In adults the hernia is generally supposed to pass out through the space through which the umbilical vein originally passed; some surgeons, however, hold that the opening is really in the abdominal wall above the exit of the cord. The coverings of an umbilical hernia are sub-peritoneal fat, fascia, and skin. The sac always contains omentum, usually with a portion of the colon and sometimes also with small intestine.

In the herniæ of adults there are almost invariably adhesions between the contents and the sac, the omentum especially being often very adherent. Intestine may also be adherent to the sac wall or to the omentum, and the separation of the various constituents of an irreducible umbilical hernia is often a matter of extreme difficulty. These herniæ are very liable to become the seat of obstruction or strangulation; the strangulation occurs either at the point of exit through the abdominal wall or beneath bands or through holes in the omentum. The latter











## LUMBAR HERNIA.

This occurs in the triangle of Petit, which is formed by the iliac crest below, the latissimus dorsi on the inner and the external oblique on the outer side. The abdominal wall is weak at this spot and violent strains may cause a hernial protrusion.

**Treatment.**—The best treatment is to provide support either by a truss with a large pad and a perineal strap to prevent it from slipping up, or by firmly fitting corsets with a suitable pad ; the latter are often the more satisfactory. If the apparatus does not control the hernia or if it causes pain—as it often does from pressure on the crest of the ilium—it may be advisable to perform an operation much on the same lines as for ventral hernia (*vide supra*).

## EXCESSIVE SEPARATION OF THE RECTI.

It is not uncommon in women, as the result of repeated pregnancies, for the recti to become widely separated and to allow a marked bulging of the whole centre of the abdominal wall. As a rule a well-fitting belt suffices ; but if a radical operation seems to be advisable, closure may be

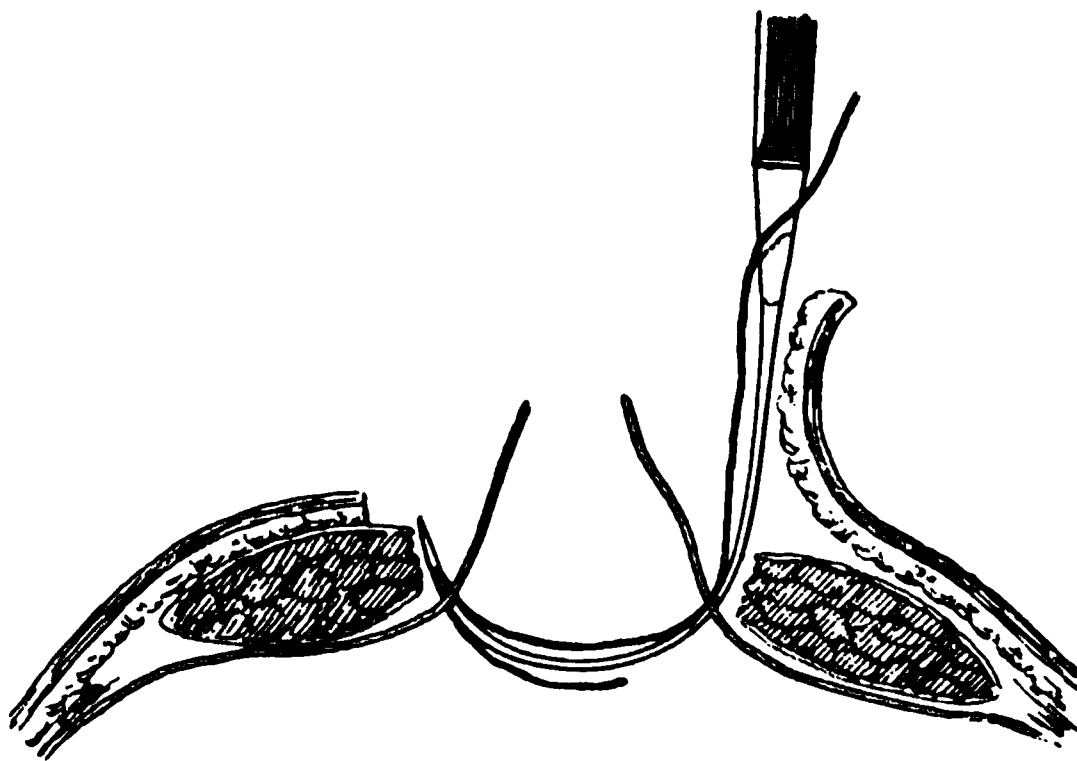


FIG. 170.—METHOD OF OPERATING FOR UNDUE SEPARATION OF THE RECTI. The inner edge of the rectus on each side is denuded of its sheath and the redundant peritoneum is cut away after a series of sutures have been inserted in the manner shown above. Then through-and-through sutures are inserted in the abdominal wall.

effected by making an incision a little to one side of the middle line, removing the fibrous tissue between the recti, bringing them together by stitches, and inserting mattress sutures through the entire thickness of the abdominal wall, as shown in the diagram (see Fig. 170). The through-and-through sutures are tied after the skin has been stitched up.





## CHAPTER XXXI.

### FÆCAL FISTULA AND ARTIFICIAL ANUS.

THE term ' fæcal fistula ' is applied to those communications between the interior of the intestinal canal and the surface, in which there is no obstruction to the passage of fæces along the bowel and in which, therefore, only a small portion of the contents escape through the opening, while the larger part, and at times all, passes on along the ordinary route. The term ' artificial anus,' on the other hand, is limited to the cases in which there is a distinct obstacle to the onward passage of the fæcal contents and in which they all, or almost all, escape through the external opening.

#### FÆCAL FISTULA.

This condition may arise either from disease of the intestine or from operative procedures, and the opening in the intestine may be immediately adherent to the abdominal wall, or may lead into a cavity in the interior of the abdomen which again communicates with the surface by a sinus. The latter condition is not uncommonly met with after abdominal suppuration, especially in connection with the appendix. A fæcal fistula may also originate in connection with malignant disease of the intestine ; in that case, perforation takes place and an abscess forms and discharges externally. Fæcal fistula may follow rents of the peritoneal coat in operating on cases of tuberculous peritonitis (see p. 450), it may result from accidental wounds of the bowel in operations such as the removal of adherent ovarian cysts, or the surgeon may deliberately establish a fæcal fistula, as when an artificial opening is made into the cæcum. ' Congenital fæcal fistula ' is referred to on p. 369 ; these are usually, however, cases of artificial anus because all the intestinal contents are discharged through the opening owing to the small calibre of the intestine below.

**TREATMENT.**—A considerable number of fæcal fistulæ close spontaneously under suitable non-operative treatment—at any rate, when the opening in the bowel is not immediately adherent to the skin. In fæcal



is done in colostomy, in which one of the main points is the formation of an efficient spur. It may also occur in strangulated hernia in which the affected loop has sloughed and a spur has formed preventing the onward passage of the contents. Apart from cases of colostomy for malignant disease of the large bowel in which the opening is meant to be permanent, cases occur in which the opening is only temporary and may be closed subsequently. For example, an artificial anus may be established for intestinal obstruction, and when this condition has been relieved the abdomen may be opened again and the tumour causing the obstruction removed. Again after resection of gangrenous intestine, when an anastomosis has not been made at the time, subsequent closure of the orifice becomes important. Or again when colostomy has been done for ulcerative colitis or some other inflammatory condition, the opening may be closed when the disease has passed off.

**TREATMENT.**—In all these cases the essential point is to get rid of the spur, and various methods have been employed for the purpose. In most cases the proper procedure is to open the abdomen, excise several inches of the bowel including the artificial anus, and then to unite the remaining portions. Special care is necessary to avoid introducing septic material into the abdomen. The disinfection of the skin, which is impregnated with faecal material, should be begun and frequently repeated for at least a couple of days before the operation. At the commencement of the operation the artificial anus should be encircled by an elliptical incision and the skin dissected up around the opening, and stitched closely together so as to prevent the escape of the intestinal contents during the operation. An incision is now carried through the abdominal wall on both sides of the attachment of the bowel, and the peritoneum is opened at a spot where the latter is not adherent to the bowel beneath. The finger introduced into the peritoneal cavity will define the line of adhesion of the peritoneum to the bowel, and the part of the abdominal wall in which the opening is situated should be divided all round with blunt-pointed scissors just outside the seat of the adhesions. The bowel is thus freed from the abdominal wall and has the skin around the artificial anus still adherent to it and stitched over the orifice. The loop is drawn as far as possible out of the wound, the general peritoneal cavity is shut off by packing and a resection is performed in the usual manner.

There are other methods of getting rid of the spur, of which we may mention the use of Dupuytren's clamp, one blade of which is introduced into each portion of the intestine and then the two are gradually approximated. This sets up peritonitis between the adjacent limbs of the bowel and the part included in the clamp sloughs, and a free lateral opening is thus established between the two limbs of the bowel. The forceps shown in Fig. 157 may be used for this purpose. When the communication has been fully established, a plastic operation will usually close the external opening.



naked abdomen in these cases which show that, while in the healthy abdomen in the erect posture the point of maximum protrusion is above the umbilicus, in Glénard's disease this point is well below the umbilicus and there is a hollow above (see Fig. 171). In examining the abdomen in these cases he first measures the waist with the corsets and clothing on, and then, having removed them, applies a band around the waist in the same position as the narrowest part of the corsets, and tightens it up until the measurement is the same as before undressing. This shows the exact change in shape produced by the clothing ; and he finds a remarkable

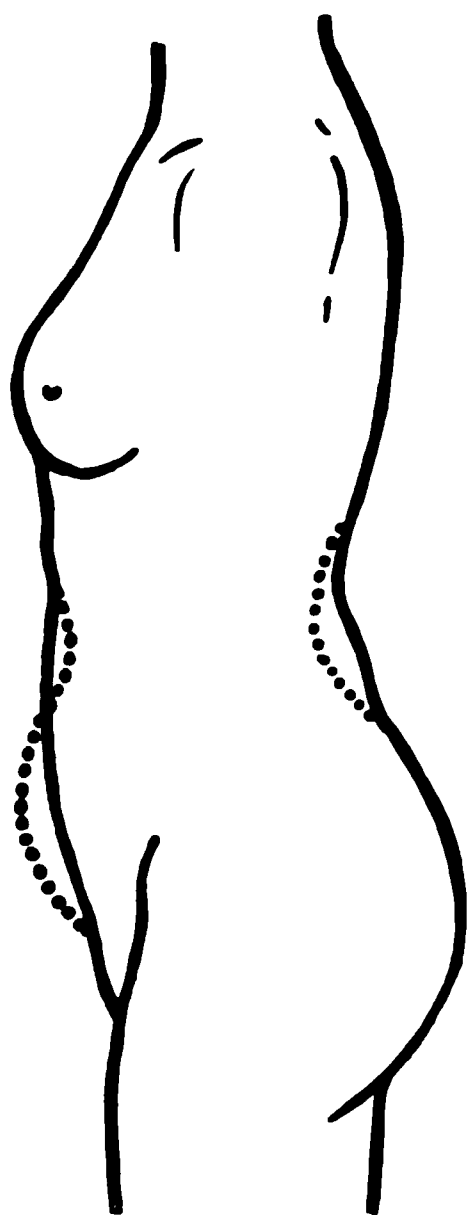


FIG. 171.—ENTEROPTOSIS. The continuous line shows the normal outline, the dotted one that of a patient with enteroptosis.

increase in the protrusion of the lower part of the abdomen in these cases when the clothing has been put on. In the recumbent position the point of greatest prominence in enteroptosis is above the umbilicus, while normally it is below. Beyond the general pendulous condition of the abdomen and its shape, and the presence of dilatation of the stomach there is nothing much to be made out on examination unless the liver, kidneys, or spleen are also movable.

It is uncertain how far this condition is congenital and due to such conditions as abnormal length of the mesentery or imperfect fixation of the hepatic and splenic flexures of the colon. The two most important *exciting causes* are distension of the abdomen, with consequent flaccidity of the walls, as after repeated pregnancies, and the management of the feminine clothing, especially the erroneous use of corsets. Hence this condition is comparatively rare in men as compared with women. A pendulous state of the abdomen and separation of the recti are very important factors ; under these circumstances the intestines lose their natural support. This will also tell on the liver and kidneys, and thus a general descent of the abdominal organs may result. As regards the management of the clothes, the chief factor is the weight of the clothing which is hung around the waist. The use of corsets is often blamed as the essential cause, but while tight lacing is no doubt a frequent source of trouble and may lead to flattening out of the right lobe of the liver, and may push down the abdominal organs, corsets when properly used are not without value. The great advantage of corsets is that they help to protect the abdomen from constriction by the tapes and bands used in suspending the nether garments. When no corsets are worn, these bands and tapes are a fruitful source of trouble, and probably do as much harm as tight corsets. Ladies who do not use corsets should therefore













reflex contraction of the muscular coat of the intestine. In Richter's hernia, too, in which only a small part of the wall of the bowel is nipped, if complete obstruction occurs it is probably brought about by entero-spasm. This is also probably the explanation of the obstructive symptoms which accompany torsion of tumours, of undescended testicles, or of the omentum, and which creates a difficulty in the diagnosis. Spasm may also be present in connection with ulcers in the stomach and bowel just as in fissure of the anus; this is especially evident in the gastro-spasm and pyloro-spasm, which not infrequently accompany ulcer of the stomach. It may also be set up by the irritating nature of the gastric or intestinal contents. Drugs, such as lead, may set up spasm, and spasm is possibly a factor in the abdominal crises of locomotor ataxia.

Apart from the occurrence of entero-spasm as a secondary factor in various forms of obstruction, it may also be the chief agent in some cases. In some hysterical patients, symptoms of intestinal obstruction may arise, accompanied by marked dilatation of considerable portions of the intestine. When the abdomen is opened, a spasmodically contracted portion of intestine may be found below the dilated part. Apart from hysteria, however, a condition of painful spasmodic contraction of the intestine or the stomach may occur, to which the name of entero-spasm (or gastro-spasm) is applied; abdominal angina is probably only another name for the same condition. Entero-spasm may occur anywhere in the intestinal canal; in the upper part it may be mistaken for biliary colic, and it may lead to acute dilatation of the stomach; in the neighbourhood of the cæcum it may lead to a diagnosis of appendicitis, in the lower colon to the formation of a thickening and a diagnosis of carcinoma.

The subjects of this condition are most commonly women—frequently of a distinctly neurotic type—and in some cases it may be associated with some emotional or mental disturbance. The pain is frequently severe and usually occurs at intervals with periods of complete cessation or of dull pain. It is often accompanied by violent retching and vomiting. The abdomen is not rigid, but there may be localised tenderness. There is not the complete constipation characteristic of mechanical obstruction; indeed, in some cases the bowels act fairly easily with enemata.

**TREATMENT.**—The really important point is the diagnosis, for, on the one hand, it is not only useless, but very inadvisable to open the abdomen for this condition; while on the other, if the case is really one of obstruction, delay in operating is most serious. When this condition is present, the two things which are of chief value are trinitrin (gr.  $\frac{1}{10}$  to  $\frac{1}{20}$ )—injected hypodermically when a severe spasm is present and repeated every three or four hours if necessary—and atropine. Of these we prefer the former on account of its rapidity of action, but the effect of atropine is more prolonged. Valerianate of zinc

in pill (gr. 3 to 5) is also recommended. Attention must also be paid to the diet, soft and easily digestible food being given, and the bowels should be kept open, but no irritant purgatives should be administered ; aloes and rhubarb are probably the best.

It has been suggested that if the abdomen is opened, the appendix should be removed, especially when the case has been mistaken for appendicitis. It is, however, always advisable, to avoid opening the abdomen at all, because the intestine is very apt to become enormously distended afterwards, and in more than one case the stitches have given way and the bowels have protruded through the wound.















unless and until the inflation has opened up a way for it ; this is ascertained by direct vision, and the necessary deflection of the instrument can be judged to a nicety. When the examination is at an end, the eyepiece is removed and the air allowed to escape as the tube is slowly withdrawn. In skilled hands no harm results from the use of this instrument, and a little practice soon renders the observer able to manipulate it easily, provided that he never uses force. It is made in several sizes, including small ones suitable for children or for passing through strictures in order to ascertain their length and the condition of the bowel beyond them.

In addition to this physical examination, careful inquiries must be made as to the character of the stools, the existence and nature of discharges from the rectum, the occurrence of any protrusion during defæcation, and various other points—all of which are dealt with in connection with the individual affections.



gradually approaches the primitive gut until finally the septum between the two disappears and leaves a single tube. Simultaneously, the anterior part of the cloacal slit is shut off from the alimentary canal and forms the urethra and the perineum.

Various malformations may be met with (see Fig. 177). Thus the rectum, and in some cases even the large intestine also, may be absent; here, however, the anal depression is often well marked, but it also may be wanting. On the other hand, the rectum may be fully developed and the anal depression may be absent; or both may be present, but divided from each other by a definite septum. Hence the presence or absence of

the anal depression gives no clue to the condition of the rectum.

The deformities may be grouped into the following classes:—

1. The rectum and the anal dimple are both developed, but are separated by a septum. Of this variety there are two distinct types. In the first there is merely a thin septum separating the interior of the two parts; in the other and more common condition there is a fibrous cordlike structure of variable length reaching from the one to the other. The peritoneum comes into close relation with this cord in front. As the upper end of the bowel becomes distended it is pressed down upon the

FIG. 178.—IMPERFORATE ANUS. Diagram to illustrate how the peritoneal reflection intervenes between the dilated rectum and the imperforate anal dimple.

apex of the anal depression and gives the impression of the existence of a mere septum; but it is not so, for there is a reflection of peritoneum between the two, and a knife thrust through the apparent septum would open the peritoneal cavity (see Fig. 178).

2. The entire rectum, or a part of it, or even of the large intestine, is absent, but the anal depression is present.

3. There is no trace of an anus, but the rectum is present. Occasionally, both anus and rectum are absent.

4. The anus may be developed, but imperforate, and the rectum may have formed a fistulous communication either with the skin—in which case the fistula opens in the neighbourhood of the perineum—with the scrotum, the penis, or, more frequently, the bladder or urethra









allowed to escape. If the gut can be drawn down close to the skin it may be possible to suture the cut edge of the mucous membrane to the skin margin with a few points of silkworm-gut (see Fig. 180). A drainage tube is introduced into the bowel so as to keep the cut surfaces apart. In three or four days dilatation is commenced, and kept up by insinuating a well-oiled little finger into the bowel, and this must be continued for a long time so as to prevent contraction. If necessary a plastic operation may be done later.

*When the bowel is at some distance from the perineum* it will be impossible to bring it down and stitch the mucous membrane to the skin as described above. Under these circumstances dilatation alone must be relied on to keep the opening patent after the operation. A useful plan is to cause the child to wear a small india-rubber plug or teat, fastened in position by a T-bandage; this, and stretching of the parts by the passage of a finger daily, may suffice to keep the stricture open until the child is old enough for a plastic operation to be performed with some prospect of success. It is quite impossible to do this at an early age owing to the smallness of the parts, and the child should be at least five or six years old before any attempt of the kind is made. The steps of the plastic operation consist in separating the mucous membrane above the stricture, excising the latter, and suturing the separated mucous membrane to the skin at the anal margin.

*When diligent search shows that the rectum is not present in the pelvis,* and especially when the peritoneal reflection has been opened and still the end of the gut cannot be found, there is no alternative but to perform colostomy, if the child's life is to be saved. This is a most serious procedure, and, quite apart from the risks pertaining to it in a new-born infant, it is a terrible calamity to inflict on the child, and many parents will quite rightly decline to permit it when the situation is explained to them as fully as it ought to be. If colostomy is decided upon, it must be done through a median incision, because it is impossible to say how much of the lower end of the gut may be absent. A median supra-pubic laparotomy is performed, the end of the bowel is found and brought out through the wound, a Paul's or Collier's tube is inserted, and the end of the bowel secured in position as for an ordinary colostomy with immediate opening of the gut (see p. 381).

Elaborate operations—such as bringing down the bowel to the anal opening after it has been found by abdominal section—are hardly possible in infants a few hours old, though one case of recovery has been reported. There is nothing for it but to make an artificial anus—at any rate, temporarily; should it be deemed possible to bring the rectum down at a later period, that may be attempted when the child is a few months older. It is hardly necessary to remark, however, that, even at this age, the child is scarcely likely to stand what must necessarily be a most severe operation.



## CHAPTER XXXV.

### INJURIES OF THE RECTUM: FOREIGN BODIES.

#### INJURIES.

INJURIES of the rectum are not very common, but are very serious when they occur. They may be met with in association with fractures of the pelvis (more particularly fractures of the sacrum) and also as the result of the penetration of foreign bodies from below.

*Lacerations of the rectum*, produced by fractures of the pelvis or sacrum, are of extreme gravity, as a communication is established between the intestine and the fractured bones, and this will often result in an osteomyelitis and a spreading pelvic cellulitis, which is generally fatal. The rectum may also be completely torn across, and here the result is usually the same. The patient is often so collapsed that any attempt to carry out the obvious line of treatment—namely, the repair of the injury to the rectum and the cleansing of the peritoneal cavity—is out of the question.

*Penetrating wounds of the rectum*.—These may be due to the penetration of a foreign body, as when the patient falls in the sitting position on to a pole or a stick. Minor degrees of wounds of the rectum are also produced by foreign bodies introduced into the bowel. These wounds may be complicated with injury of the bladder.

The seriousness of an injury of this kind depends upon whether or not there is a communication between the lumen of the bowel and the peri-rectal cellular tissue or the peritoneal cavity. When the mucous membrane alone is injured the prognosis is not very grave, the chief risk being hæmorrhage, which may be free and which is especially serious from the fact that it may go on for a long time unnoticed, because the contraction of the sphincter may prevent the escape of blood externally, and considerable distension of the rectum with blood-clot may occur.

**TREATMENT.**—This will vary according as the injury to the rectum is associated with fracture of the pelvis or with rupture of the bladder, or extends into the peritoneal cavity or into the peri-rectal



It not only diminishes the danger of bad sepsis, but it gives a chance of healing without a fæcal fistula, which otherwise results in nearly all cases in which it is necessary to open up the pre-sacral tissues down to the wound in the rectum. In performing the colostomy care must be taken to make the interruption to the passage of the fæces complete, and the closure of the colostomy wound is subsequently carried out in the usual manner (see p. 507).

(b) **Of wounds caused by foreign bodies in the rectum.**—*When the wound is non-penetrating*—that is to say, only injures the mucous and perhaps the sub-mucous coats of the bowel—the condition of affairs will be ascertained by examination with a proctoscope or sigmoidoscope (see p. 522). If there is much hæmorrhage, it may be arrested by tying or under-running the bleeding point, or, if necessary, by leaving a pair of clamp forceps in position should it be too high up for ligature. In many cases it is sufficient merely to cleanse the surface of the wound, to introduce a large drainage tube into the bowel so as to prevent accumulation of gas or fæces, and to leave the injured part to heal.

*When the foreign body has penetrated the rectal wall below the peritoneal reflection*, the peri-rectal cellular tissue behind it will require free drainage, otherwise septic pelvic cellulitis is almost certain to occur. Drainage is best effected by the perineal route—as already described for similar injuries associated with fracture.

*When the rent extends into the peritoneal cavity* the shock is less than in cases associated with fracture of the pelvis, but the treatment of the rectal condition is identical. In both cases the performance of a temporary colostomy (*vide supra*) will add to the chances of recovery.

### FOREIGN BODIES.

Foreign bodies may find their way into the rectum from above or from below ; in the former case they are either comparatively small objects—such as fish-bones—which have been swallowed, or they consist of a gradual accumulation of indigestible material—such as the skins or pips of fruits, cherry-stones, or indigestible portions of vegetables—which form a nucleus on which fæcal material and salts are deposited, and so give rise to the formation of an enterolith.

Apart from these causes, the normal intestinal contents may form a dense hard mass in the rectum, and this condition is most common in elderly persons who are the subjects of habitual constipation. This fæcal impaction may take the form either of one huge mass, which dilates the lower end of the rectum and blocks up the anus like a ball-valve, or of distension of the rectum and a considerable portion of the large intestine with hardened masses which the bowel is unable to pass on.

The other foreign bodies met with in the rectum are those



## CHAPTER XXXVI.

### INFLAMMATORY AFFECTIONS OF THE RECTUM.

#### ACUTE PROCTITIS.

SUBACUTE or chronic inflammation of the rectum is comparatively common. The acute form is rarer and may occur in connection with dysentery, with various operations about the anus or the lower end of the rectum, with injuries from foreign bodies, with ulcerative colitis, or as the result of bacterial infection—most frequently by the gonococcus, either as an extension from the vagina or as the result of pederasty.

The inflammation of the mucous membrane is accompanied by much congestion, and in bad cases results in ulceration or sloughing of the mucous surface. The tendency, however, is towards cure, provided that the exciting cause is removed and proper rest given to the bowel. In very acute cases the infection may extend through the wall of the rectum giving rise to peri-proctitis (see Chap. XXXVIII.). Should the condition persist, it passes into a chronic proctitis, either of the proliferative or ulcerative variety (*vide infra*).

The *symptoms* are distressing heat and weight about the rectum, discomfort in the pelvis, and often considerable pain, accompanied by tenesmus and the frequent passage of small quantities of faecal material mixed with mucus and often tinged with blood. If the disease is very acute and goes on to sloughing, there may be suppuration from the mucous surface. Irritability of the bladder is also a frequent symptom, whilst the anus is generally painful and may be red. Digital or proctoscopic examination is painful, and a general anæsthetic is advisable for the purpose of making a thorough examination.

**TREATMENT.**—The first essential is to remove any cause—such as a foreign body or worms. The patient should be confined to bed, and the bowels should be kept open—at first by salines and afterwards by gentle laxatives. For severe pain, suppositories containing two grains of opium with half a grain of extract of belladonna, or an enema of an





Condy's fluid or boric lotion, and later with such mild astringents as a solution of perchloride of iron (gr. ij to the ounce), tannin (gr. v to the ounce), or nitrate of silver (gr.  $\frac{1}{8}$  to the ounce). In the intervals between the irrigations a suppository containing sub-nitrate of bismuth (gr. xx) and cocaine (gr.  $\frac{1}{2}$ ), is often very useful, and a grain of opium may be added to each suppository if there is much pain. The treatment by *zinc ionisation* (*vide infra*) is useful in the cases associated with mucous colitis.

#### ULCERATIVE PROCTITIS.

This form of proctitis may occur under various conditions: it may follow traumatism; it may be a sequel to an acute inflammation in which an abscess forms or in which there is extensive sloughing; it may complicate hæmorrhoids, or it may be part of a general ulcerative colitis. It is also not infrequently found in association with papillomatous or stenosing proctitis. When an ulcer of the rectum has formed just above the sphincter it may remain open for a long time, as the contraction of the sphincter and the accumulation of fæcal material above it retard healing very greatly.

The *symptoms* are not very marked, unless the ulceration involves the sphincteric area. The chief troubles are discomfort, frequent stools, and free discharge of mucus, often tinged with blood. When the ulceration involves the sphincters, symptoms of fissure of the anus may be present (see p. 522). An examination with a protoscope or sigmoidoscope will detect the ulcer, and this should always be used, because the finger may fail to detect a small ulcer if unaccompanied by induration; moreover, it is essential to see how far up the rectum the disease extends.

**TREATMENT.**—The patient must be kept in bed in the recumbent position, and the bowels should be cleared out at first by a purge and afterwards by laxatives, whilst the diet should consist mainly of milk. Gas should be administered and the sphincter thoroughly stretched, and this should be repeated every few days as muscular power recovers and as long as ulceration persists. It may even be necessary to divide the sphincters in bad cases, but this is a serious procedure which should only be undertaken as a last resort. For the treatment of bad tenesmus a starch-and-opium enema (see p. 536) may be given every three or four hours, and this may be combined with irrigation of the rectum with warm antiseptic solutions, followed by weak astringents (*vide supra*) night and morning as the affection subsides.

Should the ulcers be sluggish in healing they may be touched with solid nitrate of silver through the proctoscope. The action of the caustic should be neutralised after a few minutes by washing out the rectum with salt solution.







intermittent dilatation of a urethral stricture. The bowels should be well cleared out before the bougie is passed, and the patient should lie on a couch in the lithotomy position. The surgeon takes a well-oiled and warmed bougie of suitable size (see Fig. 182), and tries to insinuate it through the stricture; the greatest gentleness must be observed, and it is probable that only the lowest portion can be dilated at the first sitting if the stricture is a long one. Subsequently, however, more progress can be made, until ultimately the instrument traverses the entire length of the contracted portion. The bougie should be left *in situ* for a few minutes, when—unless it is very tightly grasped—another, the next size larger, is gently passed after the first has been withdrawn. Dilatation should never be pushed beyond what the patient can comfortably bear, and never to such an extent as to tear the surface of the mucous membrane.

At first, three days should be allowed to intervene between the sittings; as dilatation progresses, the interval may be extended up to a week. When full dilatation has been established, the interval may be increased

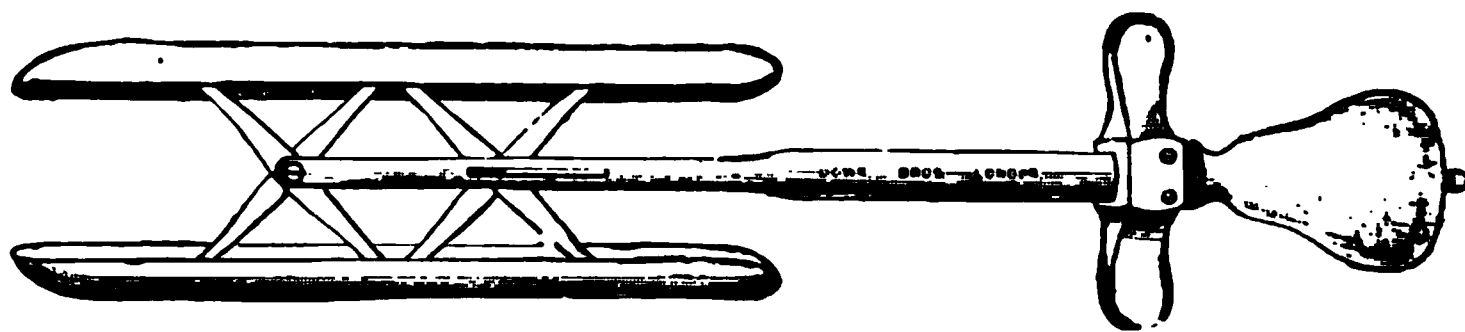


FIG. 183.—RECTAL DILATOR. The blades, which are separated by a screw-action, are parallel throughout.

up to a month if it is found that no fresh contraction has taken place meanwhile. During the entire treatment the bowels should be kept well open, and at each sitting a bougie, one size smaller than the largest passed at the previous sitting, should be used to commence with. The bougies should always be passed by the surgeon himself until the stricture is fully dilated; attempts on the part of the patient might end in serious pelvic cellulitis.

When the stricture is only about half an inch or so in extent, *an expanding rectal stricture dilator* (see Fig. 183) may be used with advantage. The instrument is introduced through the stricture with the blades closed, and the latter are then slowly expanded. The advantage of this instrument is that the dilatation can be increased without having to withdraw one instrument and introduce a fresh one. It is, however, only useful for limited strictures.

Rapid dilatation or forcible stretching or splitting of the stricture has been practised, but cannot be too strongly condemned because, quite apart from the shock, there is a grave risk of septic infection of a severe type. Even if the patient escapes these risks, there is the certainty of increased contraction afterwards.



temporary measure. The situation of the opening will depend on the extent of the proctitis. When the inflammation is limited to the rectum, the ordinary operation (see p. 379) is the proper procedure. When the induration extends to the sigmoid flexure, however, it will be necessary to open the transverse colon in order to get well above the ulcerated area. It is best to make a complete section of the bowel so as to interrupt the passage of *fæces* completely.

After the colostomy, the rectum should be syringed out both from above and below with mild antiseptic solutions—such as boric acid, Condyl's fluid, or sanitas—and after a few weeks a more methodical treatment may be undertaken. Any ulcerated area may be painted through a sigmoidoscope with strong solutions of nitrate of silver or touched with the solid salt melted on the end of a long probe, and gradual dilatation of the stricture must be carried out after healing has occurred. By this treatment, persevered with for several months, the lumen of the rectum may be so much restored that it may be safe to close the colostomy wound (see p. 507).

It must not be expected, however, that this happy result will often occur. Generally the patient will have to go through life with a colostomy opening, but, even so, his condition is much better than before, for he is freed from the constant pain, tenesmus, and obstruction, and in many cases he has as much control over the colostomy opening as he had before over the anus.

**When the stricture is complicated with active ulceration** the patient's distress is considerable. Diarrhoea, accompanied by the passage of blood, mucus, and pus, is constant and wears out the strength rapidly, and the passage of bougies is very painful. In strictures near the anus the screw dilator (see Fig. 183) every second or third day is more satisfactory than bougies. If the stricture can be fully dilated the ulcers may heal.

In most cases, however, the pain is so severe that the surgeon has to make a choice between colostomy and external proctotomy, and as a rule the former will be indicated. In some of these cases—especially when they are due to syphilis—the surgeon may find the sigmoid flexure so bound down in the iliac fossa that left inguinal colostomy cannot be easily performed: if the sigmoid flexure cannot be detached from its adhesions and brought up to the surface sufficiently to enable the bowel to be cut across completely, the transverse colon must be opened through a fresh incision.





excessively infective, and it is most important therefore that a clear diagnosis should be made.

The large condylomatous masses are usually situated near the anal orifice, but there is often an interval of healthy skin around the anal margin which at once distinguishes the condition from hæmorrhoids. The condyloma is a sessile, ovoid swelling, with its long axis generally radiating from the anal orifice, presenting a characteristic greyish-white surface and discharging a thin, watery fluid.

**Treatment.**—The ordinary treatment for syphilis (see Vol. I. Chap. XI.) must be employed, while the best local treatment is to keep the parts dry and clean, and dust them with calomel and starch (calomel one part, starch three). It is also advisable to introduce a pad of boric lint between the buttocks so as to prevent the two sides touching, because the discharges are very irritating, and fresh condylomata may appear at any point of contact. Under this treatment the condylomata may disappear in a few days.

Similar treatment should be used for large mucous patches accompanied by ulceration about the anus, but there success may not be attained so readily, and it may be necessary to stretch the anus and cauterise the ulcer with pure carbolic acid or solid nitrate of silver, because, when ulceration has occurred, a fissure of the anus is apt to persist in spite of the improvement in the syphilis.

The most important syphilitic affections are the **tertiary lesions**, which usually lead to extensive ulceration. The condition is comparatively uncommon about the anus; when it occurs it takes the form of an ulceration, spreading somewhat deeply and irregularly, and leading to serious contraction. A more usual condition is a deep tertiary ulceration of the surface of the rectal mucous membrane, and it is more commonly met with in women than in men. Ulceration may appear at any time between the late secondary and the early tertiary periods, and usually occupies the lower part of the bowel; in the great majority of cases, it spreads from below upwards, and sometimes extends as high as the sigmoid flexure and causes serious obstruction. The fact that the mucous membrane is usually involved right down to the anal orifice is a very important point in diagnosing this condition from malignant disease of the rectum, in which the mucous membrane about the anus is usually unaffected.

The ulceration occurs primarily in the mucous membrane and submucous tissues, but is soon accompanied by marked induration of the walls of the bowel. This condition is one of the chief causes of the extensive ulcerations and stenoses of the lower bowel, to which reference has been made under the head of chronic proctitis (see p. 537). The ulcers usually present clean-cut edges and are very irregular in outline; they bleed and suppurate freely.

**Treatment.**—In syphilitic ulceration about the anus the treatment must be that suitable for tertiary lesions elsewhere (see Vol. I. Chap. XI.),



skin around the anus in the form of lupus is sometimes met with in association with lupus of the female external genitals. Sometimes a tuberculous ulcer may spread from the anal margin on to the buttock, presenting all the typical characters of a tuberculous ulcer elsewhere; this condition is sometimes mistaken for syphilitic or malignant disease. The ulceration may also extend upwards from the anus to the rectal mucous membrane. The ulcer is generally large and ragged, secreting much pus and giving rise to little or no pain on defæcation. The inguinal glands may be enlarged, and as a rule there is no induration about the base of the ulcer. The progress of the affection is very slow and is often associated with tuberculous disease elsewhere—chiefly in the intestines.

When the disease affects the mucous membrane of the rectum, just inside the anus, the ulceration is very obstinate and may spread through the rectal wall into the ischio-rectal cellular tissue and give rise to an ischio-rectal abscess.

**Treatment.**—The treatment of a *tuberculous ulcer about the anus* depends largely upon the condition of the patient. When the general health is good and there are no signs of tuberculosis elsewhere, the best plan is to excise the entire ulcer if possible, even when the latter extends into the rectum. This may be done after full dilatation of the sphincter and without dividing it. If excision of the ulcer involves the removal of a large area of skin, the raw surface may have to be covered by some plastic operation. It is very important to get rapid healing around the anal orifice so as to avoid subsequent contraction. Thiersch's skin-grafting may be employed when the raw surface is farther away from the anus. When the patient is feeble and suffers also from extensive internal tuberculosis, or when the disease has extended into the ischio-rectal fossa, such radical treatment as this is often too severe.

Partial excision, scraping, or cauterising with undiluted carbolic or lactic acid, or the application of solid nitrate of silver, may be tried according to the extent and situation of the ulceration. For pain, an ointment containing orthoform and cocaine is the best. Tuberculin injections may also be employed.

*In the true rectal form of the disease*, when the ulcer has not yet penetrated the wall of the bowel, the anus should be fully dilated and the ulcers, if not numerous, thoroughly curetted and cauterised either with the actual cautery or with lactic acid; occasionally dilatation of the anus followed by the application of a 20 per cent. solution of lactic acid or of ointments containing iodoform or balsam of Peru by means of a rectal introducer (see p. 560) will lead to a cure in the slighter cases. These true rectal cases, however, are very serious and difficult to cure, and the ulcers are often numerous and extensive. We have successfully excised the entire lower part of the mucous membrane and sub-mucous tissues of the rectum, as in Whitehead's operation for piles (see Chap. XL.).



sepsis in operations upon the rectum—a point referred to fully in connection with excision of the rectum (see Chap. XLII.).

The condition when once established must be treated on the lines applicable to diffuse cellulitis elsewhere (see Vol. I. p. 31). The wound must be laid freely open and copious irrigation practised, or, better still, the patient may be kept in a warm bath. Injections of anti-streptococcic serum may be employed, but are frequently powerless, as the condition is often complicated with infection by the *Bacillus coli communis*. Vaccines may also be used, but they seldom do good.

#### ISCHIO-RECTAL ABSCESS.

This condition is far more common than the last, and the abscess may commence either below or above the level of the levator ani (see Fig. 184). Suppuration is generally due to infection from the rectum and may follow ulcers, fissures, piles, growths, foreign bodies, strictures, or injuries. There are three chief ways in which the abscess may form—namely: (1) by direct extension from a wound or injury of the mucous membrane; (2) from suppurative phlebitis; and (3) as a result of septic lymphangitis.

**Ischio-rectal abscess superficial to the levator ani.**—More than one variety may be met with. The common form is a small superficial abscess just outside the anal margin, and probably originating in the glands of that region. The pus burrows beneath the anal mucous membrane, and perforation may occur there as well as on the skin externally, the result being the formation of a small superficial fistula.

In other cases the abscess is situated beneath the mucous membrane covering the internal sphincter, and probably results from septic thrombosis of a pile. Here the pus either bursts into the bowel and gives rise to the so-called 'blind internal fistula,' or it may find its way down in the submucous tissue and turn round the lower edge of the sphincter into the ischio-rectal cellular tissue, where it forms an ischio-rectal abscess. Perforation of the mucous membrane usually occurs comparatively early, and then an external opening also forms, giving rise to the ordinary fistula in ano. The swelling and the external opening usually occur in the lateral region of the anus, whilst the internal orifice is generally situated more posteriorly.

Another variety—fortunately a rare one—results from septic lymphangitis in the ischio-rectal fossa. This form is more deeply seated and gives rise to swelling both in the ischio-rectal region and beneath the mucous membrane over the upper part of the internal sphincter. Ultimately the abscess bursts, both internally and externally, and may burrow widely in the ischio-rectal fossa, often opening far out upon the skin of the buttocks and communicating with the internal orifice by a long and tortuous canal. In cases left untreated fresh abscesses



may form, so that eventually there are a number of fistulous openings in the ischio-rectal fossa or on the buttocks, which usually converge to a single track opening into the rectum.

**Ischio-rectal abscess situated above the levator ani.**—An abscess of this kind may arise either in the peri-rectal cellular tissue or may extend from a stricture or cancer of the rectum or some disease of neighbouring structures—such as the cæcum, the broad ligament, or the prostate. It is usually accompanied by fever, anorexia, and severe deep-seated throbbing, with difficulty in defæcation. The abscess burrows in various directions, generally opening into the bowel above the levator ani, and also extending through the latter into the ischio-rectal fossa and finally bursting through the skin ; the result is that an external opening is formed from which a track runs through the levator ani into the rectum.

Tuberculous ischio-rectal abscesses are not accompanied by symptoms so severe as those of the ordinary acute variety, and may even rupture without having caused the patient any marked discomfort.

**TREATMENT.**—An ischio-rectal abscess should be opened freely as soon as its presence is detected, in order to avoid the risk of a fistula in ano ; the application of poultices or fomentations only wastes time and allows extension of the disease, and makes the formation of a fistula almost certain. The incision into the ischio-rectal fossa should be made in all cases in a line radiating from the anus, and, when the abscess is deep-seated, the incision should be kept as near as possible to the middle line so as to avoid dividing important structures. In a superficial abscess the pus is reached immediately the skin is divided ; in the deeper-seated ones Hilton's method (see Vol. I. p. 28) may be employed—a finger being placed in the rectum to prevent the risk of the forceps penetrating the bowel. It is generally well to add a second incision at right angles to the outer end of the first—converting the single incision into a  $\perp$ -shaped one—as this allows of better drainage afterwards.

In the ordinary ischio-rectal abscess the pus is very superficial and has so thinned the mucous membrane just inside the anus that it gives way even after the abscess has been laid freely open by an external incision, and a second operation for fistula in ano will thus be required. Hence, when it is found on opening one of these abscesses that the pus has come round the lower edge of the external sphincter, the best plan is to introduce a probe-pointed, flexible director (see Fig. 185) from the opening in the skin to the highest point of the cul-de-sac beneath the rectal mucous membrane, and to push the director through into the bowel, hook the point of it out through the anus, and then divide the bridge of tissue lying upon it. The operation is thus a combination of opening an abscess and slitting up a fistula in ano. The cavity is packed and treated just as an ordinary fistula in ano (see p. 554). This radical treatment is only called for when the pus burrows





entrance of the contents of the bowel into the tortuous and narrow track. When the fistula is tuberculous, the nature of the disease forms an additional hindrance to healing.

The existence of a fistula in ano is easily demonstrated with a probe ; but, before introducing the latter into the external opening, it is important to pass the finger into the bowel and to search for the internal orifice, which can often be detected either as a small depression, or, more usually, as a slight projection from the mucous membrane. The probe can then generally be manipulated along the canal until it emerges through this opening. Unless this precaution be taken, the probe may be pushed through the mucous membrane at some other spot than the true internal opening, which may not be recognised, and thus a portion of the track may escape proper treatment: this is a point of great practical importance.

**TREATMENT.**—Whenever it is possible—which will be in the majority of cases—the fistulous track should be laid open from its external to its internal opening. This treatment should always be carried out in the muco-cutaneous varieties to which allusion has been made (see p. 550), and also in the ordinary form in which the fistula does not penetrate the external sphincter, but passes below its lower edge and then burrows up beneath the rectal mucous membrane. The operation is done as follows :—

The rectum is emptied by a purgative administered two nights previously to the operation, and the bowels are washed out by a large warm-water enema three or four hours before it. It is best not to give the enema immediately before the operation, because the bowels may continue to act and the manipulations will be much hampered by the escape of liquid material. Even if this does not happen, a stool may occur immediately after the operation and the dressings may be much soiled.

The perineum should be shaved and the patient placed in the lithotomy position with the buttocks well raised on a pillow. The first step is to dilate the sphincters (see p. 573). The mucous membrane of the lower end of the rectum is then everted and irrigated, the internal opening of the fistula is identified either by inspection or palpation, and a Brodie's flexible probe-director (see Fig. 185) is passed from the external to the internal opening. When the point emerges through the internal opening it is hooked forwards with the forefinger and pulled out through the anus, so that a bridge of soft parts lies across it ; this is divided with a knife or scissors. If a Brodie's probe is not at hand, an ordinary probe may be passed through and its point hooked out through the anus in a similar manner ; the bridge of soft parts may then be divided by cutting down upon the probe until the latter is loose.

After the bleeding has been stopped, the next point is to see whether the entire fistula has been laid open or whether diverticula are present.







ani, scrape its walls, and insure proper drainage. If the sinus leads to bare bone in the pelvis, an attempt may be made to treat it appropriately. Should it run to the prostate or the broad ligament, the primary cause must be dealt with according to circumstances. The patient should in all cases be kept in bed until the deeper part of the wound has healed, and the bowels should be regulated.

*In tuberculous fistulæ* it may also be advisable to attempt a radical cure. When the fistula is situated low down, the track may be divided, its walls completely removed, and the wound packed and made to heal by granulation from the bottom, but in the majority of cases it is essential to aim at healing by first intention, and therefore the operation above described should be employed. Should the fistula be extensive and complicated by numerous tortuous sinuses, or should the patient be in bad health or in the last stages of phthisis, palliative treatment alone must suffice. The track must be properly drained, however, so that infective material does not accumulate in it and give rise to fresh abscesses. The best way of insuring this is to enlarge the external opening and dilate the track right up to the bowel. The sinus is then scraped and packed from the bottom, and the bowels are so regulated that fæces do not accumulate. If this is done, the discharge will diminish in amount and the patient will be much more comfortable, while at the same time the risk of burrowing of pus and the formation of fresh sinuses is diminished.











junction is reached. The little skin bridges between the ends of the incisions in front and behind are undermined with a tenotome, and the skin of the buttock on each side is undermined for a short distance outwards from each incision. The incisions are now brought together with silkworm-gut, and a firm pad of dressing is fixed on by means of a T-bandage. The effect of the operation is to sever the cutaneous nerve endings from their nerves and thus produce temporary anæsthesia ; sensation, however, is eventually regained. The wound should not be sutured too closely in case sepsis should occur ; if it does, most of the sutures should be removed and warm boric fomentations substituted. The bowels should not be opened until the fourth day.

## CHAPTER XL.

### HÆMORRHOIDS.

HÆMORRHOIDS, or piles, are varicose enlargements of the terminal branches of the hæmorrhoidal plexus, and form compressible swellings beneath the mucous membrane of the lower end of the rectum or of the skin around the anal margin. The varicosity generally begins at the junction of the superior with the middle hæmorrhoidal veins, but the external piles are caused by dilatation of the inferior hæmorrhoidal branches.

Hæmorrhoids are divided into *external* or *internal*, according to their position relative to the external sphincter, internal piles being situated above, and external piles below it. Frequently, however, the two varieties merge into one another, and hence a third form—the intero-external variety—is often described. Another important classification is into *symptomatic* and *idiopathic* piles, the former being secondary to some other affection, which must be relieved before the hæmorrhoidal swellings will disappear. Any interference with the portal circulation, such as occurs in cirrhosis or malignant disease of the liver, may cause distension of these veins and lead to the production of piles. Similarly, cancer of the rectum, stricture of the rectum or urethra, enlarged prostate, various uterine disorders, and certain forms of heart disease may all produce hæmorrhoids, which, although they cause the patient much discomfort, are not of primary importance and cannot be remedied unless the original cause can be removed. Idiopathic piles are those most frequently met with; they are common in middle life, but rare under twenty years of age, and generally commence about the age of twenty-five when an active athletic life is exchanged for a sedentary one. The affection is as common in men as in women; in the latter, pregnancy is a strong predisposing cause.

Heredity, race, and climate apparently influence the production of piles; Oriental races and dwellers in hot climates, for instance, are said to be more frequently affected than those living in more temperate



Far from curing the pile, this merely produces induration in it and often renders it more prominent in the quiescent intervals, and therefore more likely to be the seat of fresh acute attacks, as it becomes chronically œdematous and thickened. A certain amount of prolapse of the rectum may accompany these acute attacks, but it disappears when the piles are removed.

The piles may slough, or suppuration may occur in them—in both cases as a result of bacterial infection. It is generally held that the *Bacillus coli communis* is responsible for the phlebitis and thrombosis, while the pyogenic organisms give rise to suppuration and gangrene; fistula in ano may result from this suppuration. In the case of an external pile, thrombosis practically always cures the particular pile affected.

Patients who once develop well-marked piles generally remain subject to them for the rest of their lives. With proper treatment, however, piles may disappear almost entirely, but they are apt to recur with any error of diet or hygiene. As long as the affection is slight, the patient may be the subject of both internal and external piles without any marked inconvenience if he takes proper precautions; but when they are large, they frequently protrude externally, and the patient is not only subject to repeated attacks of bleeding, but is liable to inflammation and its various sequelæ.

### TREATMENT OF UNCOMPLICATED CASES.

This may be considered under two heads—namely, palliative and radical treatment.

**Prophylactic and palliative treatment.**—In a number of cases this is all that is required, the essential points being a proper regulation of the alimentary functions and the observance of due cleanliness. Anything that may interfere with the circulation through the hæmorrhoidal plexus should be avoided, particularly those things that cause congestion of the liver. A diet should be adopted which will neither overload the liver nor cause local irritation of the rectum. Alcohol should be taken sparingly, and highly spiced dishes and an excess of nitrogenous food should be forbidden. Constipation is probably the most potent cause of piles, and special attention must therefore be paid to the bowels. This matter is too large to deal with here, and a suitable medical text-book should be referred to; it suffices to say that the diet should be light and should contain articles promoting peristalsis—such as ripe fruits, wholemeal bread, stewed prunes, baked apples, or figs. A laxative should be taken regularly; the best are pure paraffin, cascara, effervescing sulphate of soda, or an aperient mineral water. A useful plan is to prescribe a dinner-pill containing nux vomica, belladonna, and



This operation may also be done under cocaine anæsthesia, but it is far better to give the patient a general anæsthetic, as the opportunity should be taken to dilate the sphincter and examine for internal piles, which, if present, may be removed at the same time (*vide infra*).

*If the external pile is inflamed and thrombosed*, very acute pain may be caused, especially when it is large, as the parts are so tender that the patient cannot sit, stand, or walk in comfort. The indication is to remove the clot and thus relieve the tension at once, and this may be done by injecting a few minims of a 5 per cent. solution of cocaine into the base of the pile, and then transfixing it with a sharp curved bistoury in a line radiating from the anus, laying it freely open and turning out the clot. The congestion is at once relieved and the pain disappears in a very short time, while there is no bleeding, as the vein is thrombosed. A still better plan is to put the patient under a general anæsthetic and remove the whole pile and clot in the manner recommended above, bringing the edges of the wound together with a suture. There is no objection to doing this, even when there is considerable inflammation about the part. This method has the advantage over mere incision, that it gets rid of the skin-tags that must otherwise occur, and which, in the case of a large external pile, may enclose a fairly large suppurating cavity, which takes some time to heal.

The *after-treatment* is very simple. A pad of boric lint is applied, and is removed in twenty-four hours, when the parts are washed with boric lotion, after which dry sterilised gauze is applied two or three times a day.

**(b) Of internal piles and of the mixed form.**—In ordinary uncomplicated cases it is advisable to employ operative treatment when the palliative measures mentioned above do not relieve the symptoms.

In favour of operation it may be urged that the length of time that the patient is laid up is trivial compared with the time lost by the acute attacks to which these patients are subject, and which necessitate considerable periods of rest for their treatment. Again, hæmorrhoids produce a peculiar mental effect upon the patient and may give rise to much irritability of temper and nervous depression, which disappear entirely after operation, so that the mental relief alone is remarkable. Finally, operation is practically safe and almost painless, and patients are thereby relieved from the attacks of inflammation and strangulation—accidents which are not only painful, but dangerous. We therefore advise that operation should be performed in all cases of idiopathic piles when the patient is suffering much discomfort, and we consider that operation is imperative when he is losing much blood, when the piles come down as he walks about, and when complications—especially strangulation—are present.

Opinions differ as to the best method of operation. The three chief plans are: complete excision of the pile-bearing area, removal of the piles by the clamp and cautery, and ligature.





membrane above is attached as soon as divided to the free margin of the skin below by a suitable number of sutures. The complete ring of pile-bearing mucous membrane is thus removed.

‘ Bleeding vessels throughout the operation are twisted on division. This brief description comprises the several stages of the operation.

‘ It is better to commence the separation of the mucous membrane from the skin at the lowest point, and deal with the two sides in succession, before completing the circle above, so that any oozing that may occur shall be below the work as it proceeds. The incisions must be made through the mucous membrane, and not through the skin. It is very important that no skin should be sacrificed, however redundant it may appear to be, as the little tags of superfluous skin soon contract, and eventually cause no further inconvenience. If this precaution be taken, there is no fear of stricture.

‘ The attachment of the mucous membrane and piles to the sphincters is so slight that I either employ the closed scissors as a raspatory, or use my fingers in their separation. The firmest adhesions are always found at the highest and lowest points, where the fibres of the external sphincter converge. With a very little patience the whole of the hæmorrhoidal plexus can be isolated and the membrane drawn down, leaving the external sphincter almost bare and cleanly dissected. Up to this stage of the operation there is practically no hæmorrhage, for, as is well known, the arteries which supply the rectum run immediately beneath the mucous lining, and not in the loose tissue separating it from the sphincters. These are, however, necessarily cut in the next step, which consists in the transverse division of the mucous membrane just above the piles. To prevent hæmorrhage, it is advisable to cut through the bowel by degrees, and twist each bleeding vessel as it is divided. After securing the vessels, before making any further incision in the bowel, I attach the free edge of the piece of mucous membrane first divided to the corresponding portion of skin at the verge of the anus. The procedure is repeated until the entire circumference of the bowel is secured to the skin. By this means I almost invariably secure healing by first intention. For the purpose of suturing the mucous membrane to the skin, I always employ carbolised silk, and I never take out the stitches as I find they come away by themselves without creating the needless alarm to the patient which their removal generally occasions. Indeed, after the operation, there is no real necessity ever to look at or touch the parts again.

‘ Whilst the patient is still on the table, I introduce into the rectum a suppository containing two grains of extract of belladonna, give the external parts a final dust with iodoform, and place over all a strip of oiled lint, which is retained in position by a T-bandage.

‘ For the first few days, with highly neurotic patients, I keep a bag of ice in close proximity to the rectum, and I generally recommend a dose of castor oil to be taken on an empty stomach on the morning of the

















It is most important to take adequate measures against constipation which is a prolific cause of bleeding.

**Hæmorrhage during an operation for piles** rarely causes trouble provided that the surgeon has fully dilated the sphincter. The area from which the bleeding comes is then always under inspection, the whole pile-bearing area can be protruded through the anus, and the bleeding point can either be picked up with forceps and tied or be touched with a pointed cautery; more rarely, it may be necessary to undermine the bleeding point. If a cautery is employed, it will be necessary to protect the rest of the circumference of the bowel by means of a large bivalve speculum.

**Hæmorrhage immediately after an operation**, when the patient has been put back to bed, may prove very serious unless it

is recognised early, for very free bleeding may take place into the bowel without any external sign, and the rectum may be enormously distended with clot without the escape of any blood externally. Indeed, the first symptom may be that the patient faints and shows all the signs of severe hæmorrhage (see Vol. I. p. 112). One advantage of leaving a tube in the rectum after the operation is that blood flows out and hæmorrhage is recognised early. It is of cardinal importance to see that all bleeding has ceased before the patient is sent back to bed.

When bleeding occurs shortly after the operation, the treatment must be prompt. The patient should be anaesthetised, the sphincter dilated, and all clots turned out of the rectum. In most cases the bleeding can be arrested without much disturbance of the parts by introducing a speculum into the rectum and packing gauze outside it so as to compress the

FIG. 195.—TUBE EN CHEMISE.  
The gauze for exerting pressure  
is packed tightly in between the  
tube and its petticoat.

bleeding point. For this purpose the ordinary *tube en chemise* for plugging lithotomy wounds (see Fig. 195) may be employed. This is passed well up through the anus, and gauze is thrust up in the interval between the tube and its surrounding petticoat so as to stretch the sphincter and exert firm pressure against the bleeding spot. The tube is kept in by an ordinary T-bandage, and, after the bleeding has stopped, it is withdrawn by gradually removing the packing—generally at the end of twenty-four hours. If the patient has lost much blood, continuous subcutaneous saline infusion (see Vol. I. p. 112) or an intravenous infusion of the same solution may be necessary.

Some surgeons prefer to identify and secure the bleeding point. As little inflammatory swelling will have taken place, the parts may be



least, lying upon one side with the buttocks slightly raised upon a pillow so as to prevent the mass coming down again. The bowels should be confined for a day or two.

Should this manipulation fail to reduce the piles permanently, the best plan is to apply repeated hot fomentations, which in this particular region can be done by wringing a soft sponge out of water as hot as it can be borne, applying it to the anus, covering it over with a large mass of cotton-wool and a T-bandage, and renewing it frequently. This method is particularly good for cases in which there is a large inflamed irreducible mass of mixed internal and external piles, and in which any attempt at reduction gives rise to great pain and causes increased inflammation from the spasmodic contraction of the sphincter. Unless this treatment rapidly relieves the swelling, operation should be urged—even in the face of considerable contra-indications—as the risk is much less than that of allowing the piles to become gangrenous, as they probably will.

*The treatment of gangrenous piles* is identical with that of the inflamed irreducible variety just mentioned, and consists in their immediate removal, or in the application of hot fomentations if operation is refused or thought inadvisable; morphine will be required to allay the pain. The treatment of isolated thrombosed piles is dealt with on p. 568.



by the fact that there is no sulcus around the protruded portion in true prolapse ; the latter starts directly from the anal orifice, whereas in an intussusception the prolapsed portion comes down through the anal ring, and a finger can be passed between the intussusception and the anal mucous membrane well up into the bowel.

If the condition remain untreated it gives rise to permanent loss of control from over-stretching of the sphincters. The protrusion becomes thickened and ulcerated, and may become irreducible and even gangrenous.

**TREATMENT.**—The chief aims are to remove the cause, to reduce the prolapsed portion to prevent protrusion in the intervals between the actions of the bowels, to diminish straining at stool, and to improve the local muscular tone. It is only when these aims are unsuccessful that operative treatment is called for.

(a) **In infancy.**—In the first place any condition giving rise to straining during defæcation or micturition must be remedied. Worms, polypi, hæmorrhoids, or stone in the bladder should be removed ; phimosis or constipation should be treated appropriately, and the general health should be attended to. In addition, the prolapse should always be reduced immediately after defæcation, and measures must be taken to keep it up in the interval. The prolapsed portion should be reduced by gently squeezing and pressing it backwards in the bath or after the parts have been washed with warm water and a soft sponge, and lubricated with oil. Recurrence of the protrusion may often be prevented by fastening the buttocks firmly together with a broad piece of strapping passing across them from one great trochanter to the other. Children with prolapse should evacuate the bowels while lying either upon the back or upon one side, as straining is thus diminished. Every effort should be made to improve the general health ; simple tonic, hygienic and dietetic treatment in conjunction with the local treatment described will cure most cases. •

(b) **In young adults.**—The condition is rare in young adults, and is usually the result of stricture of the urethra, piles, or polypi. When these are treated, the protrusion will usually disappear, but the cure may be facilitated by the administration of tonics and the local application of the faradaic current, one pole being placed over the lower lumbar spine, whilst the other is introduced into the anus.

(c) **In old age.**—In elderly subjects there may be not only local causes which are difficult to treat, but also a feeble condition of the patient and a loss of tone in the muscles. In addition, there is often some recurring affection, such as chronic bronchitis, which tends to reproduce the condition. In such cases some form of operation must always be employed. The following are the methods that have given the best results in our hands :—

**Linear cauterisation of the prolapse.**—This method is only of use when the mucous membrane alone protrudes, and should not be











bowel down as far as it will come. The suture material should be stout catgut or silkworm-gut ; the ends of the sutures should be left long so that they may be identified and removed subsequently. We have treated several cases in this way with success, and complete control over the bowel has been regained. At the same time the operation is severe and should only be employed for bad cases in which a considerable amount of the entire wall of the bowel is protruded.

**Colopexy.**—Attempts to shorten the prolapsed portion by suturing the bowel to the abdominal wall have often been made. Unless the operation is done very carefully and very thoroughly the union is apt to stretch and the prolapse to recur. Further, the operation does not affect the portion of the prolapse that is caused by the sliding of the mucous membrane over the submucous tissue, so that, in order to make the operation complete, removal of the prolapsed portion of the mucous membrane must also be carried out if it is not reduced by pulling up the rectal wall.

The operation consists in opening the abdominal cavity just above the left groin, seizing the lower part of the pelvic colon and pulling it up as far as it will go so as to exert traction upon the rectum. The parietal peritoneum is then divided in the iliac fossa, the edges separated, and the bowel laid down over the raw place ; the peritoneum is then stitched to it on each side. The suturing must be very carefully carried out over as extensive an area as possible. It is important not to interfere either with the lumen of the bowel or with its blood-supply. The abdomen is then closed in the usual manner, and the after-treatment is the same as after an ordinary laparotomy. Any protrusion of mucous membrane that occurs subsequently must be dealt with separately, the best plan being to remove it, as in Whitehead's operation for piles (see p. 569).

## CHAPTER XLII.

### NEW GROWTHS OF THE RECTUM.

#### POLYPUS.

POLYPI are generally met with in children, in the lower two inches of the bowel, although they occasionally occur higher up; the majority are adenomata, and are pedunculated, owing to the traction they exert during defæcation. Myomata, fibromata, and lipomata occur, but they are very rare; warty villous tumours and cysts have also been met with. A diffuse polypoid condition of the mucous membrane may also affect the whole of the large bowel from the anus to the ileo-cæcal valve.

The diagnosis is easy when the tumour is situated near the anus; there is tenesmus, accompanied by the passage of mucus and blood, and the tumour may protrude through the anus during defæcation when the pedicle is long; it presents a bright red and fleshy character, and bleeds at the slightest touch. The tumour generally recedes spontaneously after defæcation; sometimes, however, the pedicle is so long that the growth remains outside and becomes deeply congested. When the polypus is situated high up in the bowel the only symptom may be bleeding, but a true intussusception of the bowel may occur, the polypus forming its apex.

When the polypus is low down, the surgeon will feel it with the finger in the rectum, and can make out the presence of a pedicle attached to the wall of the bowel above the pile-bearing area; there should, therefore, be no difficulty in diagnosing it from hæmorrhoids. When, however, the polypus is situated high up, sigmoidoscopic examination will be necessary before the diagnosis can be made.

**TREATMENT.**—The patient should be anæsthetised, the anus dilated, and the tumour seized and pulled down with pile forceps; it should also be noted whether one or more tumours are present. The pedicle must then be ligatured, and it is important to avoid any possibility of



the inguinal chain is only affected in cancer involving the anus. Secondary deposits eventually occur in the liver, and this is a common cause of the death of the patient. Secondary growths usually increase more slowly than the primary one, especially when the latter is of the fungating variety.

The *symptoms* depend greatly on the nature and progress of the disease. In the constricting form the earliest symptoms may be those of obstruction, but the fungating form will usually be diagnosed long before any symptoms of obstruction arise. In the latter cases the earliest symptom is a feeling of discomfort about the rectum, accompanied by a desire to go to the closet—especially in the morning, but when the patient goes to stool, only a little mucus mixed with blood and débris is passed, and he experiences the sensation that the bowels have been insufficiently relieved and feels that a second attempt is necessary. The trouble is, however, often so slight that the patient takes little notice of it, thinking that he is merely suffering from some chronic diarrhoea or mucous colitis. In other cases there is alternate diarrhoea and constipation, and generally there are dyspeptic symptoms. One of the earliest characteristic symptoms is that the patient, although quite comfortable in bed, finds a mucous or foul discharge escaping from the anus directly he gets up in the morning. After emptying the rectum he remains fairly comfortable for a considerable time, but often has to seek relief more than once during the day on account of this spurious diarrhoea. When the growth is situated low down, the sphincters become relaxed, and there may be absence of complete control over the motions, accompanied by a continuous mucous discharge from the anus, which is sometimes acrid and may lead to excoriation of the skin; this discharge is often blood-stained, but profuse bleeding is rare.

Severe pain is usually a late symptom, but when the disease extends beyond the wall of the bowel, the nerves in the hollow of the sacrum may become involved, and the patient then suffers from constant dull aching in the buttocks and thighs, which becomes excruciating as the nerves become more severely compressed.

Digital examination of the rectum may reveal nothing unless the growth is within reach; when it is, the surgeon feels either a fungating mass confined to one segment of the bowel with healthy mucous membrane elsewhere, or an annular narrowing of the gut, presenting a more or less central ragged opening closely resembling a split cervix uteri. The edges are indurated, and the opening itself is firm, and in many cases the finger cannot be passed through it. When the stricture is high up, the condition known as 'ballooning' of the rectum may be present, accompanied by a patulous condition of the anus. It is in these cases that an examination with the sigmoidoscope is most valuable; this should never be omitted in any case of suspected colitis that does not improve rapidly under treatment. True piles may also occur, and should not be



this statement is that possibly the peritoneal surface may be involved while the growth is still freely movable. In most cases, however, if the bowel is mobile we may fairly assume that removal is possible so far as the primary growth is concerned. On the other hand, if the bowel is immobile, or even slightly tethered to surrounding parts, it implies that the growth has passed beyond the bowel wall and is infiltrating surrounding structures, and that the chances of freedom from local recurrence after excision are small. If it is adherent to the hollow of the sacrum, and particularly if symptoms are present which indicate involvement of the sacral nerves, the chances of obtaining a radical cure are very remote. When the growth has only passed beyond the limits of the rectum in front and has begun to involve the prostate, it is no doubt possible to remove it along with a portion of that organ, but it must be admitted that the chances of a radical cure are very slight, and under these circumstances an attempt at a radical operation is only justifiable in a vigorous patient who urgently desires a chance of life and declines palliative treatment.

*Involvement of the glands* is not necessarily a bar to successful removal of the disease. By using the combined abdominal and perineal or sacral methods an exact operation can be performed, and the glandular area that drains the affected part of the bowel may be taken away. The glands are rarely so extensively involved as to constitute a contra-indication to a radical operation if it is otherwise desirable.

*Involvement of the peritoneal coat*, though a very serious condition, does not necessarily bar operation if it is slight in extent and if there is no evidence of infection of the adjacent parts. If, however, there is any tendency to dissemination, radical operation is out of the question.

Symptoms pointing to the *involvement of other organs*, more particularly the liver, are also against radical operation. This is, however, not the universal opinion, as some surgeons prefer excision to colostomy—even when the liver is known to be affected—on the ground that the secondary lesions grow more slowly than those in the rectum, and that therefore the patient may have his life considerably prolonged if the local spread of the disease is cut short by excision. There is no doubt that a growing cancer in the pelvis is a source of increasing trouble to the patient and may cause a vast deal of misery before secondary deposits in the liver or elsewhere lead to death, and therefore there is some justification for the foregoing view. In our opinion, however, it is well to regard secondary deposits in the liver or elsewhere as a strong contra-indication to radical operation, except under very exceptional circumstances; radical operation should never be done in young subjects under these circumstances.

The *presence or absence of obstructive symptoms* has also to be taken into consideration. A patient suffering from intestinal obstruction is clearly not in a suitable condition for a radical operation, although the local conditions may be otherwise quite favourable. The obstruction





tenesmus or loss of power over the sphincter, accompanied by constant discharge from the rectum, the operation will ameliorate the condition and should certainly be advised. Another condition calling for colostomy is obstruction, either actual or impending. This subject has already been dealt with (see p. 371). After a properly performed colostomy the health of the patient improves rapidly as a result of the unhindered evacuation of the bowels, and if an abdominal exploration, made at the time the colostomy is done, shows that excision is feasible, it may still be possible to perform it at a later period when the patient's health is improved. A colostomy should therefore always be done when there are signs of impending obstruction and also as a preliminary to an extensive excision where the radical operation is inadvisable for the time being.

On the other hand, as long as a patient suffering from manifest *inoperable cancer* of the rectum remains comfortable without colostomy it is very much better that he should continue as he is; he should be kept under observation, so that, if at any time it is found that the colon is not being properly emptied or that obstruction is impending, colostomy may be done without delay. The patient's comfort should not be materially interfered with after colostomy, and sensitive persons may be intensely upset by it, and, therefore, if this condition is brought about by operation without any tangible benefit to show in exchange for it, the operation is likely to become discredited. We do not lay any stress on the view that a colostomy will lessen the rapidity of the local growth.

**Palliative treatment.**—Should the patient refuse an operation, or should excision be deemed inadvisable and the time inopportune for a colostomy, palliative measures must be adopted. The diet must be regulated so that the food shall reach the large intestine as completely digested as possible. There is no more fruitful cause of obstruction in these cases than the lodgment of hard, indigestible masses above the growth. Suitable laxatives must be employed, and a good plan is to give the patient a grain or two of extract of cascara every night in a pill, and to follow this up with a dose of an aperient mineral water in the morning, so as to obtain a fluid evacuation daily. This will often relieve the distressing tenesmus. Should there be much pain, opium, morphine, or heroin must be given either by the mouth or as a subcutaneous injection rather than by the bowel, as it is doubtful whether the rectal mucous membrane retains its normal absorbing power. When there is offensive discharge from the growth, irrigation with weak solutions of permanganate of potash, or boro-glyceride solutions are useful. When there is much oozing of blood from the growth, rectal injections of hamamelis an ounce of tincture of hamamelis with an equal quantity of water may be tried. The general health must be attended to and the patient should be encouraged to interest himself in his ordinary pursuits as much as he can without exhausting himself.



abdominal incision will be also of value by enabling the surgeon to decide whether excision is possible or not.

Before proceeding to excision, the colon must be emptied as thoroughly as possible by the administration of laxatives—particularly salines, and frequent enemata. It is well to wash out the rectum twice daily with sanitas or some other non-irritating antiseptic solution for a few days before the operation, but it is a mistake to imagine that anything like true disinfection of the bowel can be obtained in this way. In all cases in which the lower end of the bowel is to be removed, the anus should be tightly closed by stout silk sutures at the beginning of the operation.

While shock is not a very marked feature of these operations, except in the intra-abdominal forms, it is important to employ all the ordinary safeguards against it (see Vol. I. p. 118). The subsequent steps of the operation vary according to the route adopted.

**1. Excision by the perineal route.**—This was the method always employed until the introduction of Kraske's operation, but it is now seldom used, except in certain special cases, owing to the difficulty of removing the affected glands and a sufficient length of the bowel. In some cases, in which the growth is within two inches of the anus, however, the method may be employed.

*When the growth involves the anal margin* the original method may be employed; the parts are shaved and disinfected as thoroughly as possible, and, after the anus has been sewn up, an incision is made around it so as to enclose it in a wide ellipse. It is then cleared and removed, together with the sphincters and as much of the bowel as necessary, by deepening the incision into the ischio-rectal fossa on each side. Bleeding vessels are caught as they are divided, and, when the bowel has been dissected free of its surroundings well above the limits of the growth, it is cut across transversely and left at the bottom of the wound, which heals by granulation. The peritoneum is not opened. The inguinal glands on both sides should be removed, either at the same operation or at another one ten days later. The wound is lightly stuffed, and, after it has granulated well, bougies must be passed at regular intervals in order to prevent stricture.

*When the growth is situated inside the anal canal* a more extensive operation will be necessary as the bowel must be divided several inches above the upper limits of the growth. For this purpose the following method may be employed:—

The patient is placed in the lithotomy position, the anus closed by sutures, and a median incision made from the tip of the coccyx to the mid-point of the perineum, diverging on each side so as to enclose the anus in an elliptical incision. The incision from the anus to the coccyx should be carried deeply into the hollow of the sacrum; a large sponge thrust into it will check hæmorrhage. The limits of the rectum are now defined and the surrounding structures are separated from the gut, care







of the sphincter has been retained it is of course important to do this. If, however, the sphincter has been entirely removed—as will practically always be the case in the operations for cancer at the lower part of the rectum—there is no necessity for making the opening so far forward, and, as a matter of fact, the patient will be able to keep himself cleaner and manage himself better if the opening is somewhat farther back. When the opening is in the normal position, the buttocks prevent the application of any apparatus—or, indeed, of efficient pads—and, in the female especially, the parts are always soiled with *fæces*. If, however, the opening is made in the coccygeal region it is more accessible, and pads can be efficiently employed and the perineum kept clean. In this operation the opening is not so far back as in Kraske's operation and the patient can generally manage it himself. The opening in this region has the additional advantage that more of the bowel can be removed—a point of great importance in all operations for malignant disease.

When the new anal opening is to be at the posterior part of the wound the anterior part of the latter is closed with silkworm-gut sutures. When there has been no soiling of the wound, drainage is unnecessary, and it is a great advantage if it can be avoided, as any opening left may allow entrance of *fæces* when the bowel begins to act, and this may give rise to suppuration in the deeper parts of the wound. If, however, there is reason to suspect that the wound has become soiled—*e.g.* from accidental puncture or tearing of the bowel—a drainage tube must be inserted and brought out as far as possible from the new anal opening. If no sign of sepsis appears, this tube may be left out after three days and the opening closed by a stitch inserted at the time of the operation.

The final stage of the operation is the formation of the new anal opening. Before inserting any stitches it is well to give the bowel a half or three-quarter twist around its own long axis, as recommended by Gersuny ; this renders the escape of the *fæces* somewhat more difficult and thus helps to prevent constant discharge from the anal opening. The wall of the bowel is now attached to the margin of the opening in the skin by silkworm-gut sutures which pick up the serous (if present) and muscular coats of the bowel, but do not perforate the mucous membrane.

This procedure leaves a large portion of the rectum (including the diseased tissues) hanging out of the closed wound ; so far, there has been no escape of the intestinal contents and no soiling of the wound. The problem remaining is to remove the diseased portion and at the same time to prevent soiling of the wound with *fæces* for as long a period as possible. This may be done in two ways. In one a silk ligature is applied around the bowel about an inch below the attachment to the skin and drawn tightly so as to constrict the bowel completely. The wound is now protected with gauze and the bowel cut across about half an inch below the ligature. The exposed mucous membrane is rubbed





operation, and the usual measures are taken against shock (see Vol. I. p. 118). The bowels should be kept confined as long as possible by the use of opium—preferably in the form of laudanum—so that the healing of the wound may be fairly advanced when the first action occurs. Before this happens, all deep stitches should be removed so as to avoid infection along the stitch tracks; if no septic infection has occurred, the drainage tube should also be removed. After the bowels have acted, the dressings must be changed frequently, any faecal matter being washed away by an irrigator. Should primary union occur, the patient will be well in three or four weeks; if any large amount of the wound has to heal by granulation six weeks or more may elapse before he can get about. When he begins to get up he should wear a pad fastened on with a T-bandage, but when the parts are quite sound he may be provided with a suitable apparatus. After an operation done in this manner the patient is usually comfortable if the bowels are not relaxed. An hour or so each morning must be devoted to ensuring a complete evacuation and thorough cleansing of the parts, and the patient may then go through the rest of the day without inconvenience; after the lapse of a considerable period he may even regain a certain amount of control, as the circular fibres of the bowel may assume a certain amount of sphincteric action.

**2. Excision by the sacral route.** — When the disease is situated high up the rectum, it cannot be removed satisfactorily by the operations already described, and for these cases Kraske introduced the method of removing portions of the lower end of the sacrum in order to get better access to the parts. Various modifications of his original operation have been introduced, but in all of them the removal of the sacrum does not go higher than the third sacral foramina so as not to injure important nerves, especially those which supply the bladder. The great disadvantage of Kraske's operation is that the glands are often imperfectly removed, and also a sufficient length of bowel cannot be taken away when the disease is high up. The result is that permanent recovery only takes place in a comparatively small number of cases. Another disadvantage is that the opening in the sacral region is difficult to manage unless the patient has some one to attend upon him.

This operation was at one time largely employed, but is now being replaced by the combined abdominal and perineal operation, by which the disease can be more thoroughly removed and the chances of permanent recovery proportionately increased; in addition, the situation of the new anus is more convenient. The mortality is, however, still considerably greater than that after Kraske's operation.

*Kraske's operation* is performed as follows:—

The patient is turned over almost on to the face with the left side of the pelvis a little elevated. A good plan is to place a large sand-bag over one end of the table and then to turn the patient over on his face



The rectum is now cleared up to the reflection of the peritoneum, along with all the fat and glands in the hollow of the sacrum, the peritoneal cavity is opened and the pelvic colon exposed. This is pulled down, the peritoneum being divided on each side as far as may be necessary, and the fat and tissues in the hollow of the sacrum brought down with it. The lateral vessels are clamped and tied as they are met with until the rectum has been cleared for a sufficient distance above the disease. The entire rectum with the tumour is now loose, except at the anus which has been left intact up to this point. If there is not sufficient length of bowel above the proposed point of division to reach to the anus without tension, the lower end of the bowel is dissected out in the manner described on p. 597, and thus the whole of the rectum, with the tumour and glands, hangs out of the posterior part of the wound. The anus is made just below the lower part of the sacrum in the manner described in connection with the perineal operation (see p. 600).

Occasionally it will be possible to leave the sphincter ~~ani~~ intact and make the anus in the normal position; but when the disease is high up it will be impossible to do this without dividing the bowel too near the growth; the same remarks apply to removal of the growth and end-to-end union of the divided ends of the bowel. In some cases, however, it may be possible to bring the bowel above the point of division down to the anal opening, and then the following procedure may be adopted. The sutures closing the anus are removed, and an incision is carried through the muco-cutaneous margin, as in Whitehead's operation (see p. 569), and the mucous membrane and submucous tissues are dissected up as far as the upper limit of the internal sphincter, where the wall of the rectum is tied with a silk ligature and cut across below it, and the mucous membrane, which has been dissected up, is removed. The rectum is now pulled down until the proposed line of section above the growth is just below the level of the anus. The portion of the bowel containing the growth is then cut away and the divided edge of the upper end is sutured to the anal margin. An excellent plan for pulling down the bowel is practised by W. J. Mayo (*Annals of Surgery*, Aug. 1912), who ties a tube into the divided upper end of the bowel, passes this through the anus (previously denuded of mucous membrane), and is thus enabled to pull down the upper end of the bowel to the anus, where it is stitched in place. The rest of the wound is stitched up, a drainage tube being inserted at the posterior end, and the further treatment is similar to that for the perineal operation.

In this method the lower end of the rectum is not only joined to the skin in the normal situation of the anus, but its end is embraced by the internal sphincter, so that some recovery of control may be looked for in suitable cases. The recovery of control is hardly complete, of course, because the nerve-supply of the sphincter—especially on the left side—is apt to be interfered with during the operation, but if a half twist is given













part of the rectum are removed as described in connection with the perineal operation (see p. 600). This perineal incision is then sutured, a drainage tube being inserted at its posterior end, and the patient is replaced in the Trendelenburg position. The surgeon changes his gloves and sews up the peritoneum in the pelvis, and either closes the wound in the abdominal wall completely, forming the artificial anus laterally (see p. 379), or closes the wound partially, and forms the colostomy opening at its upper end.

In a few cases, in which the disease is situated fairly low down, it may be possible to leave the anal canal and bring the upper part of the pelvic colon down through it (see p. 604), and thus avoid a colostomy. To allow of this it may be necessary to divide the inferior mesenteric artery below the origin of the colic branch so as to free the iliac colon.

(2) *When the patient is very feeble*, it may be deemed advisable to divide the operation into two stages. After the bowel has been separated from above and pushed down into the pelvis, it is covered with a thin sheet of sterilised india-rubber and the peritoneum closed over it, the abdominal incision stitched up, and a colostomy opening made as above described. Three or four days later, the rectum is dissected out from below. The objection to this procedure is that it seriously interferes with the circulation in the upper part of the rectum, and fatal gangrene or perforation may occur in the interval between the two stages.

(3) *When there are obstructive symptoms*, or for other reasons already mentioned (see p. 594), a preliminary colostomy may be advisable some days before the radical operation is performed. In that case an incision is made through the rectus as already described, and the local condition examined in order to determine whether a radical operation is advisable or not. If it is, a lateral colostomy is performed (see p. 379) and the first incision closed. The reason for making the colostomy opening laterally is because the anterior incision must be opened for the subsequent radical operation, and the colostomy opening must be some distance away from it.

When the time comes for the radical operation, the colostomy opening is plugged with gauze and the skin brought over the plug with two or three stitches, and thoroughly cleansed and disinfected. The median incision is opened up, the bowel clamped and divided near the seat of the colostomy, both openings closed in the usual manner, and the operation proceeded with as described on p. 608.

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